

APPENDIX H

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RealAudio Server

Administrator's Guide

Release 2.0

Progressive Networks, Inc.

408250-550/0005

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Chapter 1: Overview

Welcome to the world of RealAudio, the premier Internet audio delivery system. By setting up a RealAudio Server and providing audio libraries, you are becoming an active participant in the exciting new world of real-time audio on the World Wide Web.

RealAudio technology provides real-time audio-on-demand and consists of three main components: the RealAudio Player, the RealAudio Server, and the RealAudio Encoder.

- The RealAudio Player lets you listen to audio files that have been encoded into the RealAudio format. The Player plays RealAudio files in real-time across a TCP/IP network. It is available for download at no charge from Progressive Network's Website at <http://www.realaudio.com/>. RealAudio Players are available for Microsoft® Windows®, Apple® Macintosh® and UNIX® operating systems.
- The RealAudio Server enables audio streams to be sent over the Internet to RealAudio Players. Server operation is similar to that of Internet Web servers. RealAudio Servers are available for Microsoft® Windows NT®, Apple® Macintosh® and UNIX® platforms.
- The RealAudio Encoder enables users and Server operators to encode standard PC and UNIX audio files into the RealAudio format. RealAudio files containing compressed audio data can then be streamed by the Server in real-time over modem connections.

This documentation provides instructions for the installation, operation and management of your RealAudio Server. It assumes that you have a basic knowledge of the Internet and of Web server operation. Information on encoding RealAudio content can be found in the *RealAudio Content Creation Guide*.

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About this Manual

Organization

The information in this manual is arranged to allow new Server users to get a basic Server up and running, while allowing advanced Server administrators access to more advanced configuration information.

Chapter 1 – *Overview*. This chapter covers RealAudio features, an overview of RealAudio operations and system requirements.

Chapter 2 – *Installing the RealAudio Server*. This chapter details basic setup of the Server.

Chapter 3 – *Configuration and Administration*. This chapter covers more advanced Server configurations and Web site configuration.

Chapter 4 – *RealAudio System Manager*. This chapter covers GUI-based Server configuration and System Manager use and function.

Conventions

This manual uses the following conventions:

Courier font	Represents commands to be typed in or information displayed on the screen.
<filename>	Used to show where to insert information, such as the name and location of a file, or configuration parameter.
Bold	Used for names of files and folders provided in the RealAudio Server distribution.
<i>Italics</i>	Used to reference other sections in this manual.

Terminology

For the purposes of this manual, the following terms are used as defined:

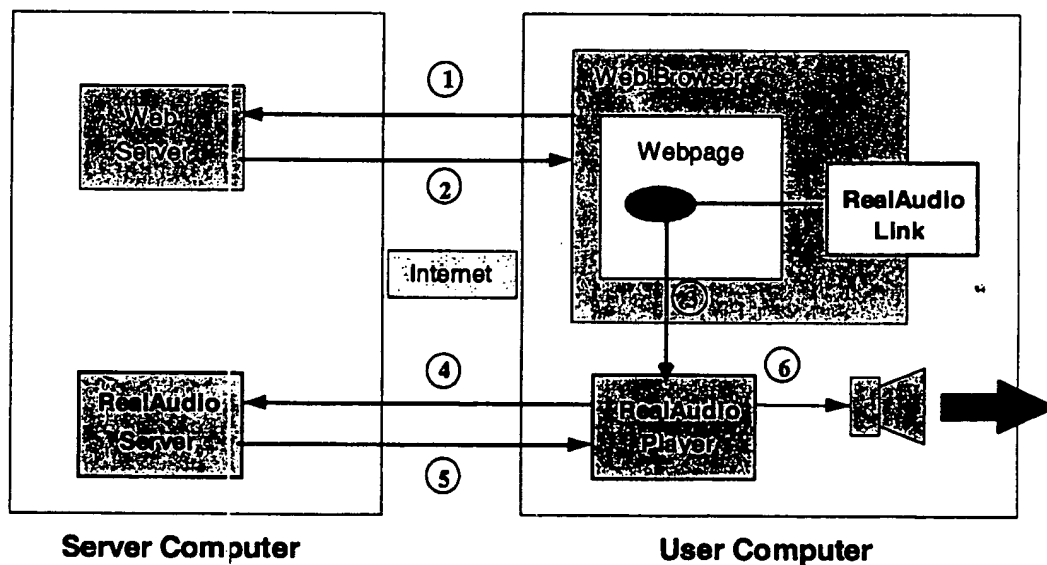
3

.ra files	RealAudio files have the .ra file name extension.
.ram files	Metafiles for use with the RealAudio helper application have the .ram file name extension. They are described in further detail in the <i>RealAudio Content Creation Guide</i> .
.rpm	Metafiles for use with the RealAudio Plug-in have the .rpm file name extension. They are described in further detail in the <i>RealAudio Content Creation Guide</i> .

RealAudio Method of Operation

RealAudio Player users typically gain access to audio content via the World Wide Web. References to RealAudio files are embedded in HTML documents provided by a Web server. The method of interaction between the RealAudio Server and the Web browser is shown in Figure 1-1.

Figure 1-1. Web browser and RealAudio interaction pathway.



When the user clicks on a RealAudio link (1), the HTML document on the Web page accesses a *metafile*. The metafile is a document that contains the Universal Resource Locator (URL) of the audio file on your RealAudio Server.¹ The URL is sent by the Web server to the user's browser (2), and then to the RealAudio Player (3). The RealAudio Player is configured as a helper application for your Web browser. The RealAudio Player requests the audio file from the RealAudio Server (4), which delivers the audio stream to the Player (5), where it is played (6).

There is virtually no time delay between the user clicking and the audio starting to play. The RealAudio Server opens the requested audio file and sends it over the network to the user's computer, where it is decoded and played through the local sound system. The RealAudio Player maintains communication with the RealAudio Server, allowing the user to control the audio stream in a manner similar to a Compact Disk (CD) player.

The RealAudio system has been specially designed to permit continuous audio playback, even over dialup connections.

RealAudio Server Features

Key features of the RealAudio Server

- High-quality audio
- Support for full random access on a per-stream basis.
- Support for multiple, simultaneous streams.
- RealAudio Encoder and utilities for creating content files for your RealAudio Server.
- Real-time encoding and serving of live events.

¹ *Metafiles* are stored in files with the *.ram* extension; the RealAudio data itself is stored in files with the *.ra* extension.

- Pre-recorded "live" delivery – a new RealAudio Server helper application, Simulated Live Transfer Agent, that takes a previously encoded .ra file and presents it as live to the RealAudio Server for distribution to RealAudio Players.
- Multi-process Servers – the RealAudio Server can be run as multiple processes within a single machine on all supported UNIX platforms. The RealAudio Server can take advantage of symmetric multi-processing, if available.
- RealAudio Hosting Service – allows fractions of the Server's capacity to be allocated to different user accounts.
- Generation of log files, thus allowing system administrators to gather statistics and usage information.
- System Manager allows remote management and monitoring of your RealAudio Server from Windows and UNIX platforms.

System Requirements

Supported Operating Systems

The RealAudio Server is available for the following architectures and operating systems:

DEC Alpha:

- Digital UNIX v3.2
- Windows NT 3.51

Hewlett Packard PA/RISC:

- HP/UX 10.01

Intel 486, Pentium:

- Microsoft Windows NT 3.51
- BSDI 2.0
- LINUX 1.x, including ELF
- FreeBSD 2.x

IBM Power PC:

- AIX 4.0

Sun SPARC:

- SunOS 4.1x
- Solaris 2.x

Silicon Graphics:

- IRIX version 5.2

Memory and CPU Requirements

The RealAudio Server has a relatively small memory footprint. A 100 stream Server, for example, has a memory footprint of approximately 2MB. A system connected by a T1 line is likely to run out of bandwidth before it runs out of memory. This estimate assumes that system resources are not overtaxed by other applications.

The RealAudio Server also has a modest CPU impact. A 100 stream RealAudio Server operating on a 90MHz Pentium consumes less than 30% of the CPU cycles.

Disk Space Requirements

The software requires approximately 2MB of disk space. Compressed audio documents require approximately 1.1kB per second of audio for 14.4 format and 2.4kB per second for 28.8 format; 1 hour of 14.4 format audio requires 3.6MB of memory and 1 hour of 28.8 format audio requires 8 MB of memory.

Bandwidth Requirements

The RealAudio Server requires at least 10 Kbps for 14.4 format and 22 Kbps for 28.8 format for each client connected to the Internet backbone. Therefore, a 56 Kbps leased line can only accommodate approximately five simultaneous 14.4 Kbps connections. A T1 line, by contrast, can accommodate over 100 simultaneous 14.4 connections, and is recommended for commercial RealAudio Server applications. Table 1-1 outlines the number of streams an Internet connection can support. The bandwidth consumed by other applications (e.g., the Web server) should be taken into account when estimating the number of simultaneous users that can be accommodated.

Table 1-1. Number of RealAudio streams vs. Internet connection.²

Internet Connection	RA 14.4 Streams	RA 28.8 Streams
Frame Relay (56Kbit)	5	3
ISDN (64Kbit)	6	4
ISDN (128Kbit)	12	8
T1 (1.5Mbit)	150	90
Ethernet LAN (10Mbit) ³	560	350
T3 (45Mbit)	4,500	2,700
100BaseT/FDDI LAN (100Mbit)	10,000	6,000

Web Server Compatibility

Except in specialized applications, users access RealAudio files via links embedded in World Wide Web pages, as described earlier. Therefore, you will most likely need to have a Web server installed and configured to recognize the RealAudio MIME types. The details of this configuration are discussed in Chapter 3. Although a Web server is needed to make the best use of RealAudio, it does not need to be located on the same machine as your RealAudio Server.

The RealAudio Server has been tested with the following Web servers:

- Webstar and Webstar PS

² RealAudio 14.4 compression requires 10 Kbps of bandwidth per stream, RealAudio 28.8 compression requires 16 Kbps of bandwidth, per stream.

³ Collisions limit the useful bandwidth to about 70%

- Mac HTTP
- HTTPD4Mac
- Netscape Netsite
- EMWAC HTTPS 0.96
- NCSA HTTPD (v1.3 or v1.4)
- CERN HTTPD (v 3.0)
- O'Reilly Website NT
- Microsoft Internet Information Server

The RealAudio Server can be configured to work with any Web server that supports configurable MIME types. If you have any questions please fill out a support request form on the Progressive Networks Web site at:

<http://www.realaudio.com/support>

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Chapter 2: Installing the RealAudio Server

This chapter discusses the basic installation and testing features that allow you to get your RealAudio Server up and running in a minimal amount of time. Chapter 3 covers full configuration parameters and more advanced RealAudio Server options. The topics covered in Chapter 2 include:

INSTALLATION

- Copying or downloading the RealAudio distribution archive file.
- Expanding the archive and installing the files in the appropriate directories on your Server system.
- Testing your RealAudio Server.

Instructions are provided for both UNIX and Windows NT. To assist you during the setup process, a checklist is provided in Appendix D.

Installing the RealAudio Server

The RealAudio Server is available directly from Progressive Networks or on CD-ROM from Progressive Networks or your RealAudio authorized distributor. Download and CD-ROM installations differ only in detail. Please see the appropriate section for your installation instructions.

Upgrading from a previous version

If you are upgrading from a previous version of the RealAudio Server you will need to take the following precautions when installing the RealAudio 2.0 Server.

Before installing the RealAudio 2.0 Server, as described below, you will need to create a new directory in which to install the RealAudio 2.0 Server. This will prevent you from affecting your existing RealAudio Server. Once you have installed and

test the RealAudio 2.0 Server, you can replace your old version with the RealAudio 2.0 Server.

Before beginning the installation examine your existing RealAudio server configuration file and note down the PnaPort number entry and the BasePath entry. If the PnaPort entry is set to 7070 or is not present in your existing configuration file, this means it is using the default port 7070, you will have to change the port number for the RealAudio 2.0 Server before starting and testing it. This will allow your existing server to continue running, while testing the RealAudio 2.0 Server.

When adding your license details to the configuration file, server.cfg, add a entry to define a different PnaPort to run the RealAudio 2.0 Server on. Add the following line to you configuration file, server.cfg,

```
PnaPort      7071
```

This will run the RealAudio 2.0 server on port 7071. If you have any problems starting the RealAudio 2.0 Server on this port because another application is using it, you will need to select a different port number and use this port number instead of 7071.

To connect to this server when testing it you must add :7071 to the pnm URL. This makes the test URL become pnm://<my.server>:7071/sound1.ra Please note, that on Windows NT you can not run two versions of the server as a Service, you will need to run the RealAudio 2.0 Server from a Command Window until you are ready to remove the existing RealAudio Server.

After you have tested your installation of the RealAudio 2.0 Server, you can then have it duplicate serving of your existing content by adding the BasePath entry from you existing Server. Make sure the BasePath entry is valid for the location you have installed the RealAudio 2.0 server in, an absolute base path is best. On Windows NT starting with the drive and a \ and on UNIX starting with a / All your existing content can then be accessed by adding the port number, 7071 to the URL as described above.

When you are satisfied the Real Audio 2.0 Server is supplying your existing content you can stop your existing server. Rename its installed directory and replace it with the RealAudio 2.0 Server. Make sure you merge all appropriate settings from your existing configuration file into your RealAudio 2.0 Server configuration file, including setting the PnaPort back to its original value. We recommend you check all existing settings against the details in the Configuration Parameter Definitions section before adding them to your RealAudio 2.0 Server configuration file.

Installing from the Progressive Networks Web Site

Before you can download and install the RealAudio Server, you must have authorization from Progressive Networks. As an authorized customer, you are sent a URL to use for downloading the software. To download the RealAudio Server distribution file follow the download instruction prompts.

If you download the Server distribution file to a machine other than the one on which you will run it, you must move the distribution file to the correct machine before you uncompress it. Use a utility such as FTP for this purpose. On Windows NT, the Server distribution file is in the form of a .zip file. On UNIX it is in the form of a compressed .tar file.

Contents of the RealAudio Server Archive

Once unzipped, the files reside in the `pnserver` directory, with the following subdirectories:

```
doc
bin
    \win_mon
    \win_enc
logs
rafiles
```

The `rafiles` directory is the root directory for your RealAudio content files.

Once the RealAudio Server has been installed, you can set up the configuration files using the instructions in the *Basic Configuration of the RealAudio Server* section.

To extract the Server files from the compressed RealAudio Server distribution file, proceed as follows:

On Windows NT:

You should be logged on as a user with administrative privileges. This allows you to successfully install the Server as a System Service. Installing the RealAudio Server as a Service is covered in Chapter 3.

Copy the .zip file to your root directory and execute the following command:

```
pkunzip /d server.zip
```

The directory `pnserver` with four subdirectories is added to the directory in which you uncompressed the distribution file. Note that the `/d` option is important to `PKUNZIP`. The subdirectories will not be nested properly if the `/d` is left out.

On UNIX:

You should be logged on as the super-user. Although the RealAudio Server can operate without root privileges, it may not operate to its full potential because certain system calls made by the RealAudio Server to allocate system resources at start-up can only be made by the super-user. Refer to *Starting the RealAudio Server Manually* later in this chapter for more details.

Copy the compressed `.tar` file to your installation directory and execute the following command:

```
uncompress -c server.tar.Z | tar -xvf -
```

Installing from CD-ROM

CD-ROM installation involves three steps. First, you need to make the CD-ROM accessible to the computer on which you wish to install the RealAudio Server. Second, you need to copy the server software from the CD-ROM to your computer's hard disk. Finally, you can install the documentation or optional Windows tools.

Mounting the CD-ROM

These mounting instructions are as accurate as possible. You may need to change the device name for your CD-ROM drive depending on your computer's configuration.

Windows NT

1. Insert the CD-ROM in the drive.

Sun Solaris

1. Insert the CD-ROM and wait for the Operating System to mount the CD-ROM.
2. If you are running File Manager a window displaying the disk contents appears.
3. If you are not running File Manager, in a shell enter:

```
cd /cdrom/pn_server
```

Sun SunOS

1. Insert the CD-ROM in the drive.
2. Log in as root.
3. From a shell check if there is a directory /cdrom to mount the cd on; if one does not already exist, enter: `mkdir /cdrom`
4. To mount the CD-ROM enter:

```
mount -rt hsfs /dev/sr0 /cdrom
```

DEC UNIX

1. Insert the CD-ROM in the drive.
2. Log in as root.
3. From a shell check if there is a directory /cdrom to mount the cd on; if one does not already exist, enter: `mkdir /cdrom`
4. To mount the CD-ROM enter:

```
mount -t cdfs -o noversion /dev/rz3c /cdrom
```

SGI Irix

1. Insert the CD-ROM in the drive.
2. Log in as root.
3. From a shell check if there is a directory /cdrom to mount the cd on; if one does not already exist, enter: `mkdir /cdrom`
4. To mount the CD-ROM enter:

```
mount -rt iso9660 /dev/scsi/sc0d710 /cdrom
```

IBM AIX

1. Insert the CD-ROM in the drive.
2. Log in as root.
3. From a shell check if there is a directory /cdrom to mount the cd on; if one does not already exist, enter: `mkdir /cdrom`
4. To mount the CD-ROM enter:

```
mount -rv cdrfs /dev/cd0 /cdrom
```

HP HP/UX

1. Insert the CD-ROM in the drive.
2. Log in as root.
3. From a shell check if there is a directory /cdrom to mount the cd on; if one does not already exist, enter: `mkdir /cdrom`
4. To mount the CD-ROM enter:

```
mount -rF cdfs /dev/dsk/c0t2d0 /cdrom
```
5. Since HP/UX does not support the ISO 9660 CD-ROM format, all file and directory names will be in upper case only. Please see the README.TXT;1 file in the server/hpux directory on the CD-ROM for further information. To view this file enter `vi README.TXT;1`

FreeBSD

1. Insert the CD-ROM in the drive.
2. Log in as root.
3. From a shell check if there is a directory /cdrom to mount the cd on; if one does not already exist, enter: `mkdir /cdrom`
4. To mount the CD-ROM enter:

```
mount -rt cd9660 /dev/cd0a /cdrom
```

BSDI

1. Insert the CD-ROM in the drive.
2. Log in as root.
3. From a shell check if there is a directory /cdrom to mount the cd on; if one does not already exist, enter: `mkdir /cdrom`
4. To mount the CD-ROM enter:

```
mount -rt cd9660 /dev/sd1 /cdrom
```

Linux

1. Insert the CD-ROM in the drive.
2. Log in as root.
3. From a shell check if there is a directory /cdrom to mount the cd on; if one does not already exist, enter: `mkdir /cdrom`
4. To mount the CD-ROM enter:

```
mount -rt iso9660 /dev/hdc /cdrom
```

Copying the Server to your computer

Windows NT

1. Start File Manager.
2. Open the CD-ROM drive.
3. Open a window to the drive you want to install the server on.
4. Create a pnserver directory where you want to install the server.
5. On the CD-ROM open the server\<platform>_nt directory where platform is either intel or alpha.
6. Select the entire contents of the directory and drag it into the pnserver directory
7. Change the attributes of the server.cfg file to remove the read only flag, by using the File Properties menu option in file manager.

UNIX

1. In the drive where you want to install the server create a pnserver directory:

```
mkdir pnserver
```

2. Change directory to the CD-ROM:

```
cd /cdrom
```

Change directory to the pn_server directory (Sun Solaris only):

```
cd /pn_server
```

3. Change directory to the server directory:

```
cd server
```

4. Change directory into the platform you want to install:

```
cd <platform>
```

where platform is the Operating System of your computer.

5. Use a recursive copy to move the server to your pnserver directory:

```
cp -r * <pathto>/pnserver
```

where <pathto> is the full path to the pnserver directory you created.

6. Change directory to the pnserver directory:

```
cd <pathto>/pnserver
```

7. Fix the permissions by running the following:

```
chmod -R 644 *  
chmod 750 bin logs rafiles  
chmod 755 bin/*
```

Installing Windows based tools

To install the Windows based System Manager or Live Encoder follow the instructions below.

1. Insert the CD-ROM in the PC you want to install the software on.
2. From Explorer or File Manager, change to the CD-ROM drive and open the directory for the tool you want to install: **monitor** or **encoder\live**.
3. Open the **win32** platform directory.
4. Copy the contents of the directory to a temporary directory.
5. Double click on the installation exe and follow the installation directions.
 - **lencinst.exe** for the RealAudio Live Encoder
 - **setup.exe** for the RealAudio System Manager

Accessing Documentation

The documentation is available on the CD-ROM in the document directory. You can access these by following the mounting instructions listed in the first section. In the **server** sub directory you will find the following files:

- **raserver.pdf** The Adobe Acrobat version of this manual.
The reader is available from
<http://w1000.mv.us.adobe.com/Acrobat/freeread.html>
- **raserver.ps** A Postscript version of this manual.
- **raserver.txt** A text-only version of this manual.
- **content.pdf** The Adobe Acrobat version of the *RealAudio Content Creation Guide*.
- **content.ps** A Postscript version of the *RealAudio Content Creation Guide*.
- **content.txt** A text-only version of the *RealAudio Content Creation Guide*.

These manuals can either be accessed directly from the mounted CD-ROM or copied to a hard disk.

Other Contents

The CD-ROM also contains the Player and Encoder for all available platforms, as well a number of sample files and Multimedia Presentations.

Starting the RealAudio Server for the First Time

Once you have installed your RealAudio Server you should start and test it with the supplied basic configuration. The RealAudio Server is distributed with the configuration file `server.cfg`, located in the `pnserver` directory. `server.cfg` requires two additional entries, which detail your license, and your RealAudio Server is ready to test. For testing, you should start the RealAudio Server manually from the command line and connect directly to the RealAudio Server with a RealAudio Player. When you confirm that your RealAudio Server works correctly, consult Chapter 3 for information on configuring the RealAudio Server to meet your needs and on starting the RealAudio Server automatically every time the system is booted.

Basic Configuration of the RealAudio Server

The RealAudio Server's operational characteristics are controlled by a configuration file. The configuration file provides the RealAudio Server with information about the setup of your RealAudio system, such as the location of RealAudio content files and the number of simultaneous streams to offer on the network. The configuration file is also used to indicate the location of the RealAudio Server log files, which record accesses made to your RealAudio Server as well as any error messages.

The configuration settings consist of a number of tokens, separated by white space. For example:

```
#Base path for URLs.  
BasePath      rfiles
```

Any line beginning with a # character is treated as a comment.

You can edit `server.cfg` using your preferred text editor. The two configuration settings required to start your RealAudio Server are `CustomerName` and `LicenseKey`. Complete details on all the configuration settings are presented in Chapter 3 *Configuration and Administration*.

If you down loaded your Server, the licensing information is in the e-mail that provides you the down load URL. If you purchased your copy of the Server on CD-ROM, the licensing information is provided on your invoice. If you purchase a new or upgraded license you need to re-enter this information for the new license to take effect. You must enter the exact information or the RealAudio Server does not operate. The following licensing information needs to be entered into the `server.cfg`.

```
CustomerName      <licensename>
LicenseKey        <encryptedkey>
```

These should be placed after the line

```
#Licensing Details
```

Starting the RealAudio Server

To start the RealAudio Server manually from the command line, follow the platform specific directions below. If your RealAudio Server does not start, review the error messages in the RealAudio Server Log as described in, *The RealAudio Server Error Log* section of Chapter 3.

For Windows NT:

Change directories into the `pnserver` directory of the RealAudio Server. Start the RealAudio Server by typing:

```
bin\pnserv20 server.cfg
```

The RealAudio Server starts to accept connections within ten seconds of entering the command. It will not return any messages to indicate that it has started, and there will not be a prompt on the screen for as long as it is running. To stop the RealAudio Server, use CTRL C.

For UNIX:

Change directories into the `pnserver` directory of the RealAudio Server. Start the RealAudio Server by typing:

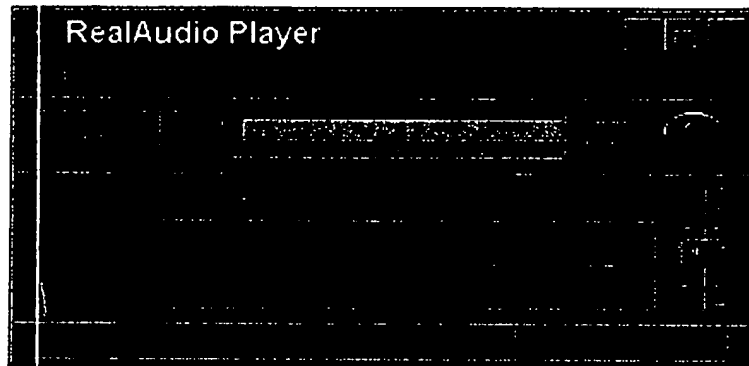
```
bin/pnserver server.cfg
```

Note that the RealAudio Server “detaches” from the shell and run in the background as a daemon process; the prompt will return immediately.

Testing the RealAudio Server

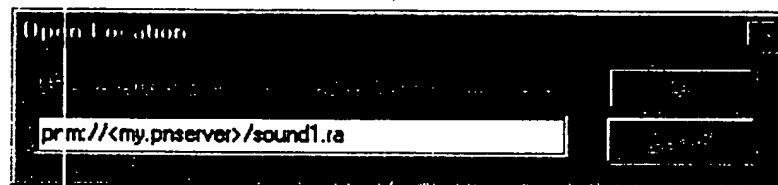
Once the RealAudio Server is started, you can test it by attempting to play the clips provided in the directory raffles. Open a RealAudio Player (Figure 2-1) on any Macintosh, Windows or UNIX computer that supports RealAudio Players and can access the RealAudio Server via a network.

Figure 2-1. RealAudio Player.



Use the Open Location dialog, on the File menu to enter the URL of the test file sound11.ra.

Figure 2-2. Open Location Dialog Box.



<my.pnserver> is the DNS name or the IP address of the computer with the RealAudio Server installed.

Machine Name or IP Address	URL
www.realaudio.com	prnm://www.realaudio.com/
123.45.678.90	prnm://123.45.678.90/

The file `sound1.ra` should play correctly. If the `sound1.ra` does not play correctly check your error log files. For more information on error logs see *RealAudio Server Access Log* and *RealAudio Server Error Log* in Chapter 3.

Additional Configuration

You have now completed the basic setup of the RealAudio Server. It is now ready and able to provide audio to computers with RealAudio Players. Additional configuration may be necessary before RealAudio Players can access files through your Web site. Please read Chapter 3 for details on how to set up your Server to work with Web sites plus information on advanced RealAudio Server configurations.

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Chapter 3: Configuration and Administration

The RealAudio Server is shipped with a basic configuration file, `server.cfg`. Chapter 2 covered editing `server.cfg` and starting and testing your RealAudio Server with a basic configuration. The RealAudio Server is a versatile program that you can customize to suit your particular use. Chapter 3 details the RealAudio operational configuration and includes information on:

CONFIGURATION

- Detailed information on RealAudio Server configuration settings
- Editing the configuration of your Web server to support RealAudio MIME types
- Configuring your Web site to play RealAudio files from your RealAudio Server

ADMINISTRATION

- Launching the RealAudio Server automatically
- Network performance
- RealAudio Server logs
- Trouble shooting the RealAudio Server
- Content management

Configuration

RealAudio Server operational configuration

The RealAudio Server is distributed with a basic default configuration file that you used and tested in Chapter 2, *Installing the RealAudio Server*. The RealAudio Server also supports three operational configurations. By adding to the default configuration parameters, you can customize the RealAudio Server to your needs.

Multi-process Servers

The RealAudio Server can run as multiple processes within a single machine on all of the supported UNIX platforms. The RealAudio Server starts the required number of processes and shares the total number of streams among those processes. Incoming streams are automatically balanced across the Server's individual processes. This allows more efficient use of system resources. This option can be configured either in the configuration file or on the command line. The RealAudio Server can take advantage of symmetric multi-processing, if available. For more information see *Maximum Threads in Configuration Parameter Definitions* later in this chapter.

The command-line option on starting the RealAudio Server is `-t n`, where `n` is the total number of processes required. For example, starting the RealAudio Server with

```
bin/pnserver -t 5 server.cfg
```

will start 5 processes. Since this configuration parameter will affect your computer's CPU usage, you should experiment to find the optimal number of processes for your system.

Clustered Servers

The RealAudio Server supports clustering of individual RealAudio Servers. This allows single RealAudio Servers to be grouped together to provide support for large stream requirements. The cluster is established with a control Server and a number of sub Servers. The control RealAudio Server allocates incoming connection requests from RealAudio 2.0 Players to the least busy sub Server. RealAudio 1.0 Players can only connect to the control Server. Once the maximum number of connections to the control Server is reached additional RealAudio 1.0 Players will not be able to connect until there are streams available; RealAudio 2.0 Players will continue to be passed on to the sub Servers as long as there are streams available.

Individual RealAudio licenses are required for each RealAudio Server in the cluster. Connecting a System Manager to any of the members of the cluster reports all streams from all Servers in the cluster.

The control Server is started with a cluster password and sub Servers are accepted into the cluster only if they supply the correct password. If a sub Server fails to connect to the cluster host it will terminate.

Control Server Configuration

The control Server defines the cluster password to set itself up as a control Server. The sub Servers connect on the standard audio port defined by PortNumber in the configuration file. Add the following parameter to your configuration file.

ClusterPassword	<clusterpassword>
-----------------	-------------------

For example,

ClusterPassword	zpassword
-----------------	-----------

Sub Server Configuration

The sub Server needs to be given the host and port number for the control Server, as well as the cluster password. The following configuration entries are used.

ClusterHost	<clusterhost>
ClusterPort	<clusterport>
ClusterPassword	<Control Server password>

For example,

ClusterHost	Maze
ClusterPort	7070
ClusterPassword	zpassword

For parameter configuration information see *Configuration Parameter Definitions* later in this chapter.

RealAudio Hosting Service

The RealAudio Server supports the ability to subdivide the stream capacity of your Server between multiple accounts. This feature, called RealAudio Hosting Service, is controlled by your license. If you would like to upgrade your RealAudio Server License please contact the Progressive Networks Sales Department at 1-800-230-5975. This feature allows the RealAudio Server's capacity to be allocated to guarantee certain content or individuals stream access. A configuration entry is

created for each individual or organization that requires RealAudio Server stream. This entry contains the account tag, usually the user or organization, a path for the content and a minimum and maximum stream limit.

One example of RealAudio Server Hosting is providing a specific audience guaranteed access to particular content. This is achieved by creating a `UserList` entry that has a minimum field set to the number of Players you wish to guarantee access to this event and then giving the target audience a different URL to access the event. This URL could be either directly to the RealAudio Server or to a hidden page that contains a link to the appropriately configured `.ram` file that contains the account tag. On UNIX, a symbolic link to the actual `.ra` file would allow access from the multiple URLs. This could be useful for a live event where you want a public and a private channel.

The following example shows the configuration settings to create 3 segments on a RealAudio Server with a 100 stream license installed on `www.raserver.com`:

```
UserDir rafiles
UserList [ {fred, /usr/home/fred, 0, 2},
           {betty, /usr/home/betty, 0, 2}
           {musicthing, /different/disk/music, 20, 50} ]
```

The preceding example has three account entries defined. For more detailed parameter definitions see *Configuration Parameter Definitions* later in this chapter.

A file in `<fred>` is accessed by using a URL of the form
prn: //www.raserver.com/~fred/noise.ra. This file is located in the directory `/usr/home/fred/rafiles`. There is no minimum stream defined so if the RealAudio Server is busy with other connections then connections to this URL fail. A maximum of two simultaneous streams is available for this account entry.

`<betty>` is identical to `<fred>` except that the URL is
prn: //www.raserver.com/~betty/sound.ra and the directory for these clips is `/usr/home/betty/rafiles`.

`<musicthing>` is a larger client that has a separate disk installed to hold their samples. These clips are accessed using a URL of the form
prn: //www.raserver.com/~musicthing/clip1.ra. The `.ra` file would be located in `/different/disk/music/rafiles`. This client is always guaranteed at least 20 connections. This means that only 80 connections are available on the RealAudio Server for other connections. The maximum number of simultaneous connections that this client can have is 50.

Configuration Parameter Definitions

In addition to the basic configuration changes outlined in Chapter 2 the following list details the other configuration parameters available.

NOTE: Default path names are specified relative to the directory from which the RealAudio Server was started. It is recommended that you change these defaults to absolute path names once you are satisfied with your RealAudio Server location or if you have changed the location of any of the RealAudio directories.

Audio Connections

The maximum number of simultaneous audio connections your RealAudio Server can support is determined by the license you have purchased. This entry allows you to set a limit less than or equal to this number. To specify a lower value, enter the following line in the server.cfg file:

```
AudioConnections    <count>
```

For example,

```
AudioConnections    10
```

would not allow more than 10 simultaneous connections. The maximum number of connections cannot usefully exceed the maximum number that the bandwidth of your Internet connection supports.

Base Path

Most RealAudio content delivered by your RealAudio Server will reside in, or beneath, the directory specified by the **base path**. For further information on organizing RealAudio content please see *RealAudio Content Management* in Chapter 3. Use the following format to enter the absolute pathname of the base path directory into the server.cfg file:

```
BasePath            <rafiles>
```

It is suggested that this path point to the **rafiles** subdirectory of your RealAudio Server installation directory, as this directory contains several sample documents.⁴

For example,

```
BasePath      c:\pnserver\rafiles
```

Cluster Host

This entry is required by the sub Server in clustered Server operation.

```
ClusterHost    <Host name>
```

Where <ClusterHost> indicates the host name of the control Server in the cluster. For example,

```
ClusterHost    maze
```

would tell the sub Server to connect to the computer maze and the RealAudio Server located there.

This configuration setting is only used at startup and changes during Server operation have no effect until the Server is restarted.

Cluster Password

This is used by both the control Server and the sub Servers when running as clustered Servers. Refer to the *Clustered Servers* section above.

```
ClusterPassword <string>
```

On the control Server this sets the password the control Server expects to receive from the sub Servers. On the sub Servers this sets the password that the sub Servers send to the control Server. For example, to set the cluster password as **zpassword** the parameter would look as follows:

```
ClusterPassword zpassword
```

Cluster Port

This entry is required by the sub Server in clustered Server operation.

⁴ Note that both the / and \ characters are accepted on Windows NT as a field separator. Only / can be used on UNIX.

ClusterPort <portnumber>

Where <ClusterPort> is set to the RA port in use by the control Server. For example,

ClusterPort 7070

This configuration setting is only used at startup and changes during Server operation have no effect until the Server is restarted.

Customer Name

This is one of two configuration settings you must enter in order for your RealAudio Server to function. If you downloaded your Server, <licensename> is in the e-mail that provides you the download URL. If you purchased your copy of the Server on CD-ROM, <licensename> is provided on your invoice. If you purchase a new or upgraded license you need to re-enter this information for the new license to take effect. You must enter the exact information or the RealAudio Server does not operate.

CustomerName <licensename>

Default Error File

If you only provide RealAudio content in 28.8 format or use bandwidth negotiation but do not provide all your files in both formats, the Player receives an error message when it tries to access a file it is unable to play. If you have set this configuration parameter, the RealAudio Server provides a RealAudio file of your creation instead of the message box. Enter the path to this file in the server.cfg file with the following format:

DefaultErrorFile <Path/to/Error.ra>

For example,

DefaultErrorFile c:\pnserver\rafiles\error.ra

If a RealAudio Player configured to operate on a 14.4 modem tries to play a file in 28.8 format it will receive the audio contained in error.ra. The path to your error file should be an absolute pathway. Your error file should indicate that there was a format compatibility problem. For example, "We are sorry but the file requested is not available in your Player's format. Please try another file."

Error Log Path

The RealAudio Server logs client identification and information about errors which occur during the operation of your Server to the error log specified by the **ErrorLogPath**. Enter a line using the following format into **server.cfg**:

ErrorLogPath <path to error log file>

It is suggested that this path point to the file **pnterror.log** in the **logs** subdirectory of your RealAudio Server installation directory. For example,

```
ErrorLogPath      c:\pnserver\logs\pnerror.log
```

License Key

This is one of two configuration settings you must enter in order for your RealAudio Server to function. If you down loaded your Server, <encryptedkey> is in the e-mail that provides you the down load URL. If you purchased your copy of the Server on CD-ROM, <encryptedkey> is provided on your invoice. If you purchase a new or upgraded license you need to re-enter this information for the new license to take effect. You must enter the exact information or the RealAudio Server does not operate.

LicenseKey	<encryptedkey>
------------	----------------

Local Host

On some platforms, the system will not return a fully-qualified domain name, which causes difficulty for the RealAudio Server in locating other RealAudio Servers in a clustering configuration or in locating itself in a multi-processing configuration. With the `LocalHost` parameter, you can override the system default domain name and provide the RealAudio Server with a fully-qualified domain name:

LocalHost <fullhostname>

where <fullhostname> is the fully-qualified domain name for the Server machine.
For example:

LocalHost mycomputer.mycompany.com

If you experience problems running multiple processes, you can set the `LocalHost` parameter in your `RealAudio Server` configuration file. If you experience problems running a clustering configuration, you can set the `LocalHost` parameter in the configuration file of the particular `RealAudio Server` which the control Server is having difficulty locating.

Log Path

The RealAudio Server logs information regarding every access to your Server into the file specified by the **LogPath**. Enter a line using the following format into the **server.cfg**:

```
LogPath      <path to access log>
```

It is suggested that this path point to the file **pnaccess.log** in the **logs** subdirectory of your RealAudio Server installation directory. For example,

```
LogPath      logs/pnaccess.log
```

uses a relative path from the directory the RealAudio Server was started from.

Maximum Threads

This entry allows the RealAudio Server to run multiple processes with in a single machine; refer to *Multi-process Servers* above for more details.

```
MaxThreads   <count>
```

Where **<MaxThreads>** sets the number of processes to run for the RealAudio Server.

For example,

```
MaxThreads   5
```

would start the RealAudio Server with five processes. Since this configuration parameter will affect your computer's CPU usage, you should experiment to find the optimal number of processes for your system.

Maximum System Manager Connections

The System Manager is a Windows application used to track the operation of a running RealAudio Server. Its use is described in Chapter 4. The System Manager connects to the RealAudio Server over a TCP/IP connection and the maximum number of these connections should be restricted to the number of System Managers that you anticipate running.

The maximum number of System Manager connections defaults to 4, and does not reduce the allowed number of audio connections. To specify a different value, enter the following line in the **server.cfg** file:

MonitorConnections <count>

For example,

MonitorConnections 6

would allow six System Managers to connect to the RealAudio Server.

Monitor Password

To ensure that unauthorized users cannot monitor your server, you must insert the following into the `server.cfg` (for Windows NT) or `server-conf` (for Unix) file.

MonitorPassword <passwordOfYourChoice>

You can share this password for diagnostic purposes.

Process ID Log (UNIX Only)

If requested, the RealAudio Server for UNIX can record its process ID in a file. You can use the following format to specify the filename for the process ID log:

PidPath <pid file>

It is suggested that this path point to a file in same directory as your log files. For example,

PidPath pnserver/logs/pnserver.pid

PNA Protocol Port

All Internet services receive calls from clients by listening at a particular port number. The RealAudio Server normally operates on TCP port 7070. In order to specify a different port number, enter the following line into your `server.cfg` file.

PnaPort <portNumber>

For example,

PnaPort 7070

would set the port to 7070. You need to be signed on as the super user in order to use a port lower than 1024 on a UNIX system. The only reason to use a port other

than the default is to allow several Servers to coexist on one system, or to achieve some level of privacy when serving information by using an unusual port number.

Connection Timeout

Since every connection consumes valuable resources, users should not be permitted to "go idle" for long periods of time. Playing audio does not constitute going idle, of course. The user is idle only if the connection is used to pause audio, or the Player has reached the end of the audio program without disconnecting.

By default, the RealAudio Server will "hang up" on a connection after five minutes of idle time. To set a different value, you must add the following line to the `server.cfg`:

```
Timeout                <Seconds>
```

You can set the `<Seconds>` from 120 to 900 seconds. For example, with a configuration setting of

```
Timeout                240
```

the Server would "hang up" on a Player that is idle for four minutes. The client can automatically reconnect after being timed out by the RealAudio Server if the user hits the play button.

User and Group ID (UNIX Only)

In order to allocate additional system resources for delivering a large number of RealAudio streams, the Server must be started under the super-user account. Once the program has started, and these resources have been allocated, however, the Server is free to change its identity to a less privileged user and group ID.

Use the following format to indicate the names of the user and group names which you wish the Server to assume once it has started:

```
User    <UserName>
```

```
Group   <GroupName>
```

User Directory

This setting optionally specifies a constant path to be appended to the `privateRPath` defined for the account entries. For more information refer to `UserList`.

UserDir <string>

If no UserDir is specified then the RealAudio Server will expect to find .ra files in privateRPath. If, however,

UserDir rfiles

then the RealAudio Server would expect to find .ra files in privateRPath/rfiles

UserList

This field is used to create RealAudio Server Hosting. Refer to *Server Variations* above for more information on Hosting. UserList entries can not be remotely added or deleted from the System Manager. The UserList entry only supports changes to existing entries from the System Manager. For example, you could change the maximum or minimum number of connections a particular account is authorized. To make more substantial changes to the UserList you will need to edit server.cfg.

UserList

```
[ (Accnt, privateRPath, minStreams, maxStreams),  
  (Accnt1, privateRPath, minStreams, maxStreams),  
  (Accnt2, privateRPath, minStreams, maxStreams) ]
```

There can be as many entries in this list as required. The individual entries are defined below.

The <AccntN> defines the key that the URL passes to the RealAudio Server to allow selection of a particular account entry. <AccntN> does not have to be a user directory and can be a string up to 1024 characters. The key is preceded in the URL by a --. For example:

```
prnm://www.realaudio.com/~fred/test.ra.
```

This would select the account entry defined for the user fred and then play the RealAudio file test.ra from their privateRPath directory.

The <privateRPath> entry allows a separate basepath for .ra files to be setup for each account entry. This allows the owner of the entry to be given rights to alter the files in their own directory without allowing them access to any other user's files.

The <minStreams> entry allows the RealAudio Server owner to specify a minimum number of streams that will always be available to play this account's RealAudio files. When streams are allocated to a particular account entry in this fashion the streams are no longer available to any general RealAudio Server requests.

If the `<minStreams>` setting is set to 0 then no streams are reserved for that account entry.

If more than the available streams are allocated to individual account entries then the RealAudio Server logs an error and provide access to the minimum streams for all those entries in the `UserList` before the limit was exceeded. All account entries after the limit is exceeded will not be able to accept connections and play their RealAudio files.

The `<maxStreams>` entry places a upper limit on the number of simultaneous streams that can be accessed for each account entry. This number can be from 0 to the total number of streams available on the RealAudio Server.

Changing the Configuration of a Running Server

The RealAudio Server can be forced to reload and change its configuration without stopping. For example, you may wish to authorize an additional System Manager connection or fewer audio connections.

Windows System Manager based configuration:

The Configuration parameters available in the 2.0 RealAudio Server can be manipulated from the System Manager. This allows easy GUI based editing of these values without having to directly access the RealAudio Server. See Chapter 4 for more details on the System Manager and GUI based configuration.

UNIX Server

In addition to GUI based editing, a running server on a UNIX machine can be reconfigured by editing the `server.cfg` file and delivering a HUP signal.

After making the desired changes to the configuration file, deliver a HUP signal to the Server to force it to re-examine its configuration.

```
kill -HUP <processId>
```

where `<processId>` is the process id of the RealAudio Server. If you do not know the process id, check the `pId` file or run `ps` to obtain it. The exact parameters for `ps` depend upon the version of UNIX you are using.

On ESDI, FreeBSD, LINUX, and SUNOS, use:

```
ps -aux | grep pns
```

On AIX, HP/UX, DEC UNIX, IRIX, and SOLARIS, use:

```
ps -ef | grep pns
```

Configuring Web Servers for Use with RealAudio

Before the Web server will handle RealAudio metafiles⁵ properly, you must configure it to recognize them as the following MIME:

audio/x-pn-realaudio (files with a .ra or .ram file extension)

audio/x-pn-realaudio-plugin (files with a .rpm file extension)

The MIME type is communicated in the HTML header sent to the user's Web browser. It tells the Web browser to activate the RealAudio Player on its computer. If you do not configure the MIME type correctly, the user's Web browser will try to download the content of the RealAudio file rather than activate the RealAudio Player. If this happens the user will need to empty the cache on their Web browser.

The procedure for creating this association varies from one Web server to another. The following list gives information on MIME type additions for some of the most common Web servers in use today. If you are in doubt, or if your Web server is not on our list, please consult your Web server documentation or the online documentation at the Progressive Networks Web site at

<http://www.realaudio.com>

CERN HTTPD (v.3.0) Server

Add the following line to the "httpd.conf" file under the Server's root directory:

⁵ Metafiles are text files that refer the RealAudio Player to the RealAudio file. They are described further in the *RealAudio Content Creation Guide*.

```
AddType .ram audio/x-pn-realaudio binary
AddType .rpm audio/x-pn-realaudio-plugin binary
```

and then reinitialize the Web server.

EMWAC HTTPS (Windows NT Only)

In the HTTP server applet in the Control Panel, click on the button along the right hand side of the window marked "New mapping."

A dialog window will display existing MIME type mappings, along with a "Filename extension" text entry box along the top. Type the filename extension "RAM" into the extension field, and then enter the full MIME type:

audio/x-pn-realaudio

into the text entry field just below the words "MIME type:" and above the scrollable list of existing MIME types. Finally, select OK to add the new MIME type to the main list.

Repeat the above steps, entering RPM into the extension field and the MIME type audio/x-pn-realaudio-plugin. You will then need to reinitialize the Web server for the changes to take effect.

Mac HTTP and HTTPD4Mac Servers

Enter the following information into your configuration file in the format appropriate for your server:

Action: TEXT

File Suffix: .ram

File Type: *

MIME Type: audio/x-pn-realaudio

Creator: *

Repeat with .rpm as File Suffix and audio/x-pn-realaudio-plugin as MIME Type.

Microsoft Internet Information Server (Windows NT Only)

MIME type configuration is done in the Windows NT Registry. For directions on changing the Windows NT Registry consult the Windows NT Help file and documentation.

The following two MIME types need to be added:

```
audio/x-pn-realaudio, ram
audio/x-pn-realaudio-plugin, rpm
```

NCSA HTTPD (v. 1.3 and 1.4) Server

For NCSA, two approaches are possible.

1. Edit the file "MIME.types" in the SERVER_ROOT/conf subdirectory. Add the following lines:

```
audio/x-pn-realaudio    ram
audio/x-pn-realaudio-plugin  rpm
```

2. Edit the file "srm.conf" in the SERVER_ROOT/conf subdirectory. Add the following lines:

```
AddType audio/x-pn-realaudio    ram
AddType audio/x-pn-realaudio-plugin  rpm
```

Either approach will work, but the "MIME.types" file on many installations is often left as distributed by NCSA, and local configuration is done by adding the AddType directive to the "srm.conf" file. Once the MIME type is added using either approach (but not both), reinitialize the Web server.

Netscape Netsite Server

Add the following to the "MIME.types" file:

```
type=audio/x-pn-realaudio    exts=ram
type=audio/x-pn-realaudio-plugin  exts=rpm
```

Add the following line to the Server's main configuration file (called "magnus.conf" in the examples given in the Netsite documentation):

```
Init fn=load-types mime-types=mime.types
```

and then reinitialize the Web server.

O'Reilly Website NT Server (Windows NT Only)

To change the MIME type on the O'Reilly NT Web Server, use the admin tool on the mapping page to change the content type by giving the following commands:

```
.ram audio/x-pn-realaudio
```

```
.rpm audio/x-pn-realaudio-plugin
```

Webstar and Webstar PS

Open the Admin program for the Webstar server, pull down the Configure menu and select Suffix Mapping. When the Suffix Mapping dialog window opens, enter the MIME type information into its associated fields exactly as shown in the following example (these fields are case sensitive):

Action: TEXT

File Suffix: .ram

File Type: *

MIME Type: audio/x-pn-realaudio

Creator: *

Select the Add button to update the MIME types directory.

Repeat with .rpm as File Suffix and audio/x-pn-realaudio-plugin as MIME Type.

Administration

Starting the RealAudio Server Manually

To start the RealAudio Server manually from the command line, follow the platform specific directions below. If your RealAudio Server does not start, review the error messages in the error log as described in, *RealAudio Server Error Log* section of Chapter 3.

For Windows NT:

Change directories into the top level directory of the RealAudio Server. Start the RealAudio Server by typing

```
bin\pnserver20 <configfile>
```

For example:

```
bin\pnserver20 server.cfg
```

The RealAudio Server starts to accept connections within ten seconds of entering the command. It will not return any messages to indicate that it has started, and there will not be a prompt on the screen for as long as it is running. To stop the RealAudio Server, use CTRL C.

For UNIX:

Since the RealAudio Server runs on a high-numbered, unprivileged port, it is not necessary to start the Server as the super-user (root). However, super-user privileges are necessary when the RealAudio Server needs to configure itself to use additional system resources, as it may when a large number of concurrent connections is expected. If the RealAudio Server is started as super-user (root), it changes its user id once the resource limits are adjusted, and assumes the user and group ids entered into the configuration file.

Change directories into the top level directory of the RealAudio Server. Start the RealAudio Server by typing:

```
bin/pnserver <configfile>
```

For example:

```
bin/pnserver server.cfg
```

Note that the RealAudio Server “detaches” from the shell and runs in the background as a daemon process; the prompt will return immediately.

Launching the Server Automatically

Once the RealAudio Server has tested satisfactorily you should configure it to start automatically each time the system is rebooted. If you will be starting your RealAudio Server automatically each time your computer system is rebooted, you will need to enter full paths into any configuration parameter in the RealAudio Server configuration file that requires a path.

The methods for doing this differ between Windows NT and UNIX.

For Windows NT:

The RealAudio Server is installed as a “Service” under Windows NT. This means that it can be controlled from the “Services Control Panel” and will start and stop automatically when the system is booted or shut down.

If you are upgrading your RealAudio Server from Server 1.0 to Server 2.0, please note that there is a new command to install the RealAudio Server as a Service. The ISRA command is no longer used. You also need to remove the RealAudio Server being replaced before installing the new RealAudio Server. You can remove a RealAudio Server 1.0 by using the command

```
del /s /q %windir%\system32\RealAudio\server10.exe
```

from the Server 1.0 bin directory.

To install the RealAudio Server as a Service, you must logon as a user with Administrative privileges. To install the RealAudio Service, execute the program `crtsvc.exe` from the `bin` directory where you installed the Server distribution. Execute the program as follows:

```
crtsvc <drive>:\pnserver\bin\pnserv20.exe  
          <drive>:\pnserver\server.cfg
```

where `<drive>:\pnserver\bin\pnserv20.exe` is the path to `pnserv20.exe`, and `<drive>:\pnserver\server.cfg` is the path to the RealAudio Server configuration file, `server.cfg`.

Entries have now been placed in the system registry for use by the Service Manager. If you improperly installed the Server as a service (e.g., it will not start from the

Services Control Panel) use the following command from the bin directory to uninstall the RealAudio Server as a service.

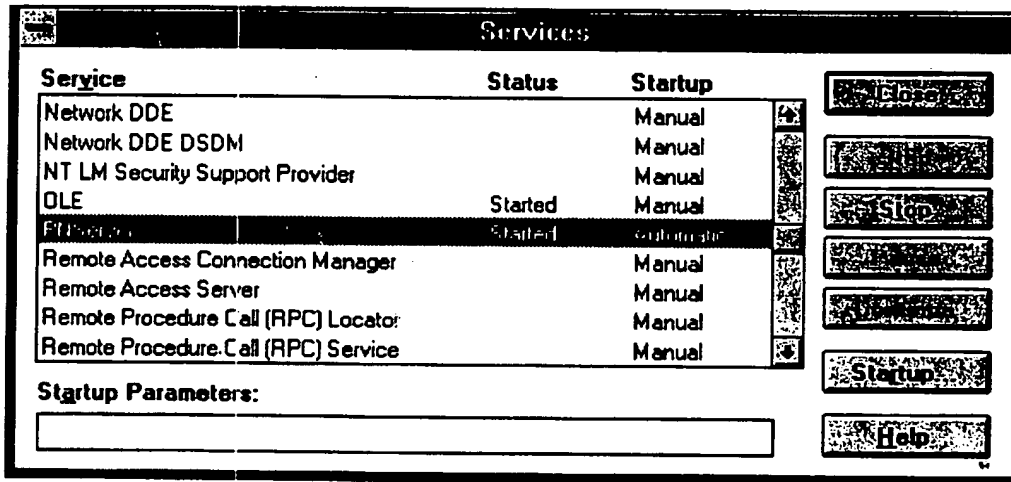
```
delSvc
```

This command can be used if at a later date you wish to remove the RealAudio Service. Make sure that the RealAudio Server is stopped prior to removing.

If you have changed the path for the Server executable, `pnserv20.exe` or configuration file, `server.cfg`, you can run `crtsvc.exe` again with the new parameters after removing the prior RealAudio Server as a Service.

To start and configure the RealAudio Service, use the NT Services Control Panel.

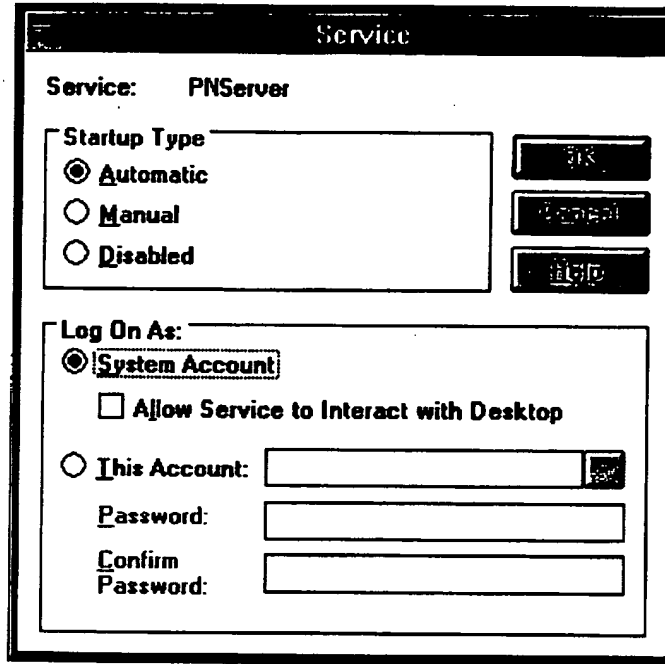
Figure 3-1. The Windows NT Services Control Panel



Within the Services Control Panel, select the RealAudio Service. You can now start and stop the service, using the buttons on the right.

The "Startup" button takes you to the following dialog box, which is used to configure the Server startup parameters. For automatic operation, the settings should be as shown in Figure 3-2. The Startup Type is set to Automatic and the Service is set to run with System Privileges.

Figure 3-2. Service Startup Dialog Box



When you install and run the RealAudio Server as a Service, errors are written to the NT error logs rather than the error logs specified in the configuration file. In order to view the error logs you have to sign on as the System Administrator. To view the error logs select Administrative Tools from the control panel, then Event Viewer, then Log Menu and finally Applications.

For UNIX:

It is suggested that a command to start the RealAudio Server be added to the boot-time scripts of your UNIX system by your system administrator. (The boot-time scripts generally reside in files or directories beneath the /etc subdirectory.)

Stopping the RealAudio Server

For Windows NT:

If you are running the RealAudio Server as a Service, open the Services Control Panel and locate the RealAudio Server. You can use the Stop button on the right side of the control panel to terminate the Server (see Figure 3-1).

If you are running the RealAudio Server from the command line, use the CTRL-C command to stop the RealAudio Server.

For UNIX:

If you know the process id, use the following procedure, while logged on with the same user id as the Server (or as super-user):

```
kill <processid>
```

If you don't know the process id you can use the command

```
kill `cat logs/pnserver.pid`
```

from the pnserver directory.

To verify that the RealAudio Server is stopped, use the appropriate ps command for your system.

Network Performance Issues

The Internet is not an error free medium: there are a number of factors that can interfere with the quality of the audio being delivered to your users. Audio packets can be lost during delivery through the Internet if they hit slow routers, or if the network is especially busy. Recurrent problems may indicate that you need to modify your connection to your Internet service provider.

To monitor audio quality, you should occasionally use the RealAudio Player to make an Internet connection to the links on your Web page. When the connection is made, open the Statistics window for the RealAudio Player to monitor the percentage of packet loss that is occurring. If the audio quality is poor, it is likely that your users are experiencing the same.

Since RealAudio files use 10 to 19 Kbps while playing, you should first check the configuration file for the number of connections to ensure that your Internet

connection can handle the peak throughput; refer to *Maximum Audio Connections* for more details.

If you determine that there is a high packet loss level, your first step will be to consult your Internet provider. You may need a faster Internet connection or there may be other problems with your Internet service.

RealAudio Server Access Log

The RealAudio Server Log uses the common log file format used by most Web servers to record transactions by clients using the RealAudio Server. Each transaction is recorded on one line in fields delimited by white space. To view the RealAudio Server log, open the file specified by the name used in your LogFilePath using Notepad, Microsoft Word or some other text editor.

Since new information is appended to the log each time a new connection is completed or attempted, it is possible that the log will grow quickly. To keep your log files at a manageable size you should change them on a regular basis. For information on changing a log file see *Changing the Log Files* later in this chapter.

The purpose of the Server log is to help you monitor and manage your RealAudio Server. You can view how many clients have connected to your server, the name of the host machines, the clips they listened to, the times of day they connected, and errors that were generated by the RealAudio Server. This information can give you an idea of who your audience is and what clips are popular. By monitoring the log for errors, you can troubleshoot and correct possible problems on your site.

An example of a log entry might be as follows:

```
123.45.678.90 - - [21/Jun/1995:13:44:32 -0800] "GET
/html/pnaudio/gore_sta.ra PNA/4" 200 0 \
[WIN 2.0.0.8] [STAT1:50 3 2 0 0 28_8]
```

The following information is represented in each field.

1. Client IP Address, e.g.:

123.45.678.90

2. Time Information. This records the time that the client made access. The format used is as follows:

[day/mon/year:hh:mm:ss TZ (vs GMT)]

For example:

[21/Feb/1995:13:44:32 -0800]

3. Document requested by client. Information appears in the following format:

GET <filename>

For example:

GET /html/pnaudio/gore_sta.ra

4. Protocol version used by the client to obtain information from the RealAudio Server and an identifier for the client's protocol. The first part should read "PNA" to reflect the RealAudio Server protocol. The protocol information appears as follows:

PNA/<X>

where <X> is the protocol number (currently 5-8).

5. Return code (using HTTP standard error codes). By convention, World Wide Web servers use return code 200 to indicate that document transfer was successful. The RealAudio Server follows this format. Currently, all entries in the access log should indicate a return code of 200.
6. Number of bytes transferred during playback. This field will often be lower than the total size of the RealAudio file, indicating partial playback of the file. If, however, this field is consistently low for some or all audio files, this may indicate that RealAudio Players are able to connect to your server, but are unable to play files. You may need to check your system error logs in such a situation for messages relating to network system errors.
7. Client Player id string. This field is not part of the common Web server access log format. The id string is text sent by the client that describes the version and type of RealAudio Player being used to access audio files.

For example:

[WIN 2.0.0.8]

8. **Connection Statistics.** When a Player completes playing a clip it can provide connection information to the RealAudio Server. This information can be valuable for diagnostic purposes, especially if your clients are reporting difficulties with playback and you suspect network access problems. Client statistics are reported in the following format:

```
[STAT1:50 3 2 0 0 28_8]
```

The fields contain the following information:

Keyword. At this time the keyword is always STAT1, but additional keywords may be used in the future.

Total packets. This number indicates the total number of packets received by the client.

Out-of-order packets. This does not necessarily degrade the quality of the audio. The packets are reordered as they are being played by the client.

Missing packets. This is the most common problem reported on the PN Server Log. If the percentage of missing packets is low, then it will not have a serious effect on quality, but if it is high, then the audio will be seriously degraded. See *Network Performance Issues* for more information.

Early packets. If the client receives any packets too early, then older packets are discarded. This problem is very rare, and it may indicate that the client's machine is running too slow, or has a bad Internet connection. However, if this problem shows up very often, you may need to investigate further.

Late packets. If the client receives packets too late, the Player will have already passed that portion of the audio. This is also a very rare occurrence, and if it happens often, your Internet connection may not be fast enough.

File format played. Indicates if the Player played a 14.4 or 28.8 format file.

RealAudio Server Error Log

The RealAudio Server Error Log records a variety of messages from the RealAudio Server, many of which are informational rather than an indication of actual errors. Since new information is appended to the log each time an error message is generated, it is possible that the log will grow quickly. To keep your log files at a manageable size you should change them on a regular basis. For information on changing a log file see *Changing the Log Files* later in this chapter.

Error messages are recorded in the error log with the following format:

[Date] [Time] [Servername] (ProcessID) : [Error Message]

For example:

15-Mar-96 14:13:30.488 myserver(1556) : No such user: joe

Appendix C lists the error messages that get recorded to the error log. The following list of errors are some of the more common error messages you might encounter.

OS limit exceed: max connections set to <connection number>

The number of simultaneous connections has exceeded the capacity of your operating system. The RealAudio Server has reset the number of audio connections it will allow to connect.

Invalid license key or information

Either you have not specified any licensing information in `server.cfg` or the licensing information you entered was incorrect. Check to make sure the information was entered exactly as you received it.

This license is for another platform

The license information you entered in `server.cfg` is for a different operating system. Check to make sure that you installed the RealAudio Server on the proper machine.

Server can not be started before <date>

The RealAudio Server license you purchased does not become valid until the date listed. Since the RealAudio Server requires a valid license in order to operate your RealAudio Server will not start until the date listed.

Server cannot be started after <date>

The RealAudio Server license you purchased is not valid after the date listed. Since the RealAudio Server requires a valid license in order to operate your RealAudio Server will not start without a current license.

Your license does not support ISP Hosting.

Your configuration file contains RealAudio Hosting Service settings, but your license does not include Hosting Service. The Hosting Service configuration settings will have no effect.

You must restart the server for this change to take effect.

You have made a change in `server.cfg` that will not take effect until you restart the RealAudio Server.

Password failure on cluster attempt from <hostname>:<portnumber>

A sub Server attempted to connect to the control Server with an invalid password. Check `server.cfg` on the indicated sub Server to be sure that you have entered the correct ClusterPassword and ClusterPort.

Out of Memory

The "Out of Memory" error message is given if the RealAudio Server is unable to dynamically allocate enough memory to create a new connection or manage existing connections. If you receive an **Out of Memory** message, you may require additional memory or you may need to swap space for your RealAudio Server machine to use for dynamic memory allocation.

Document not Found

This error message indicates that the user tried to access a document and the document could not be found. It may be that the user tried to use the wrong URL and the Server kicked the request back. However, if you see this more than once for the same documents, you should check your metafile to ensure that the path pointing to the document is accurate.

SIGPIPE Received, code:13 (UNIX systems only)

The SIGPIPE signal is sent to the RealAudio Server by the operating system when the client abruptly cuts the connection. No action is required for this error, it is simply an informational message

Changing the Log Files

Windows NT: Changing the log files on Windows NT requires changing the name of the log file set in the configuration file. Changing the configuration of a running RealAudio Server operating on Windows NT is done through the System Manager.

Connect the System Manager to the RealAudio Server with the log file you want to change. From the Windows based System Manager select Configuration Menu from the Server Menu. Locate the log file setting, either ErrorLogPath or LogPath, you

want to change. Enter the new name for the log file. Select OK. The old log file will be closed and the RealAudio Server will start writing to the new file.

For complete information on the RealAudio System Manager please see Chapter 4 *RealAudio System Manager*.

UNIX: On UNIX platforms you can change the name of an open file and the computer will continue to write to the renamed file. This renaming does not involve making changes to the RealAudio Server configuration file. If your RealAudio Server is running on a UNIX machine you can use this feature to change your RealAudio Server log files.

After renaming the log file to be changed, either the error log or the access log, issue a SIGHUP signal. The RealAudio Server closes the existing, now renamed log file when the Server receives a SIGHUP signal. When the next access or error message needs to be logged the RealAudio Server will re-open the log file using the settings in the configuration file.

For example, if you wanted to change your access log file named pnaccess.log you could rename it access1.log. The RealAudio Server continues to write to access1.log until the RealAudio Server receives a SIGHUP. Once the RealAudio Server receives the SIGHUP access1.log is closed and pnaccess.log is reopened with the next access message to be logged.

You can also use the Windows based System Manager to change the log files. The instructions detailed above for Windows NT work for remotely changing a UNIX based RealAudio Server log file from a Windows machine.

If you do not want to keep your log files you can simply delete the desired log file and issue a SIGHUP. Once the RealAudio Server receives the SIGHUP a new file will be opened.

Troubleshooting the RealAudio Server

If you are experiencing problems with the RealAudio Server, you will need to use the RealAudio Player to test links on your site to isolate the source of the problem. Before you try to connect to your site, launch the System Manager to see if the Server already has the maximum number of connections, and to insure that the maximum number of connections have not been made. If your RealAudio Server has a license that includes RealAudio Hosting Service you can insure that your RealAudio Server Administrator can always connect a Player to the RealAudio Server by reserving a stream for this purpose.

Some problems will generate the following error messages.

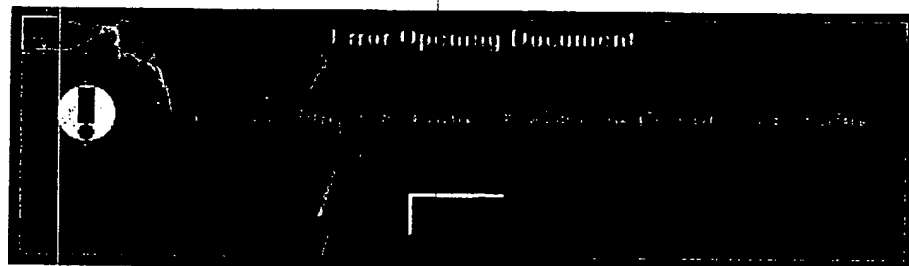
If the Server IP address has been typed incorrectly or is non-existent, you will receive an invalid file message from the Player:

Figure 3-3. URL Error Message Box.



If the RealAudio Server address is wrong or non-existent, you will also see the following error message from the Player:

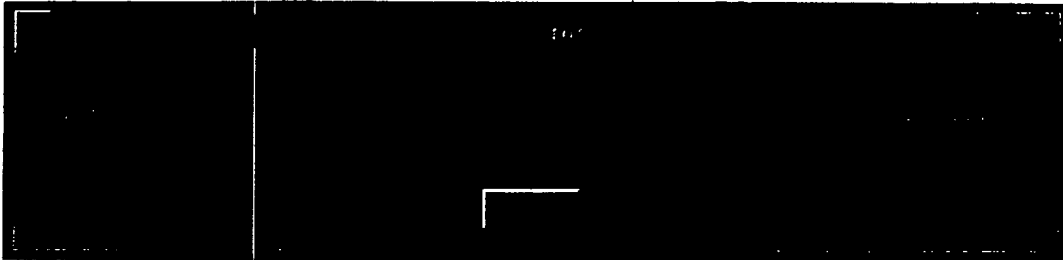
Figure 3-4. Error Opening Document Message Box.



Either correct the hostname or try the IP address.

If the Server IP address is valid, but the filename portion of the URL is invalid, then you will see the following error message. Check the filename and the BasePath parameter in the configuration file and then try again.

Figure 3-5. Error Message Box.



Additionally, there are several error messages generated by the RealAudio Player that may be received while testing the RealAudio Server.

No document by that name available at the requested location. If the Player is unable to locate the document, it may indicate that the URL address referenced in the .ram file is incorrect or that the basepath is incorrectly specified.

Document is empty. The Web server at this location is too busy to give you the requested file.

Server disconnected. The Server is probably too busy at this time. You will need to make a connection later. Use the System Manager to check activity on your Server before attempting a new connection.

Server disconnected. Player cannot receive UDP packets on port 7070. If the Player is behind a firewall, or if the connection to the Internet is through The Internet Adapter (TIA), it will prevent the Player from receiving audio packets sent by the Server. Firewalls must be configured to allow RealAudio to play through them, see Appendix B, *Firewalls* for details.

Insufficient information to specify the target document. When you use the Player File menu option to request a file, an incorrect URL designation will return this error.

If you receive one of the first four messages above your server is not running. For other errors you should check the following:

Is the Server running on the host machine?

If you received any of the first four messages above your RealAudio Server is running. Otherwise use ps (on UNIX), or the Services Control Panel to check if the RealAudio Server is running. If the Server is not running, repeat the procedure for manually starting the server, as described in Chapter 2.

Is the IP address of the host machine correctly configured in the network routers?

If the Player cannot access the Server over the network, then you cannot expect audio to play. Configuring IP address and routers is a complex issue. Contact a networking specialist for help on this.

Is the machine you are using to test the audio connected to the network used by the Server host computer?

You must have a network connection between Player and Server for audio to play. Contact a networking specialist for help on this.

Is there a firewall between the Player and the Server?

You need to configure your system's firewalls to allow RealAudio to play through them; refer to Appendix B, *Firewalls* for details.

Can you connect to the Server with the RealAudio System Manager?

The System Manager application will help you to diagnose the problem by validating communications between the Player computer and RealAudio Server and by allowing you to view the running state of the connection during attempts to play back audio.

Is the RealAudio file downloading to the Player instead of playing in real time?

RealAudio files cannot be referenced directly by your Web document. Remember that the Web page is being served by a Web server, but the RealAudio file is being served by the RealAudio Server. The Web page must point the user's Web browser to the RealAudio file by way of a metafile, which is a text file you create and save with a .ram extension. The metafile contains the URL of the .ra file located on your RealAudio Server. The Web page contains a

link to the metafile. To find out more, please read the section *Configuring a Web Site to Play RealAudio*.

Is there unreadable text displaying on the screen instead of audio?

You have not configured your Web server to recognize RealAudio MIME types. Refer to the section *Configuring Web Servers for Use with RealAudio*.

The Server log also records errors made by the RealAudio Server. For instructions about how to open and interpret the Server log, see, *RealAudio Server Error Log*.

If you still have problems after considering these possibilities, please send email to Progressive Networks at server2@prognetwork.com.

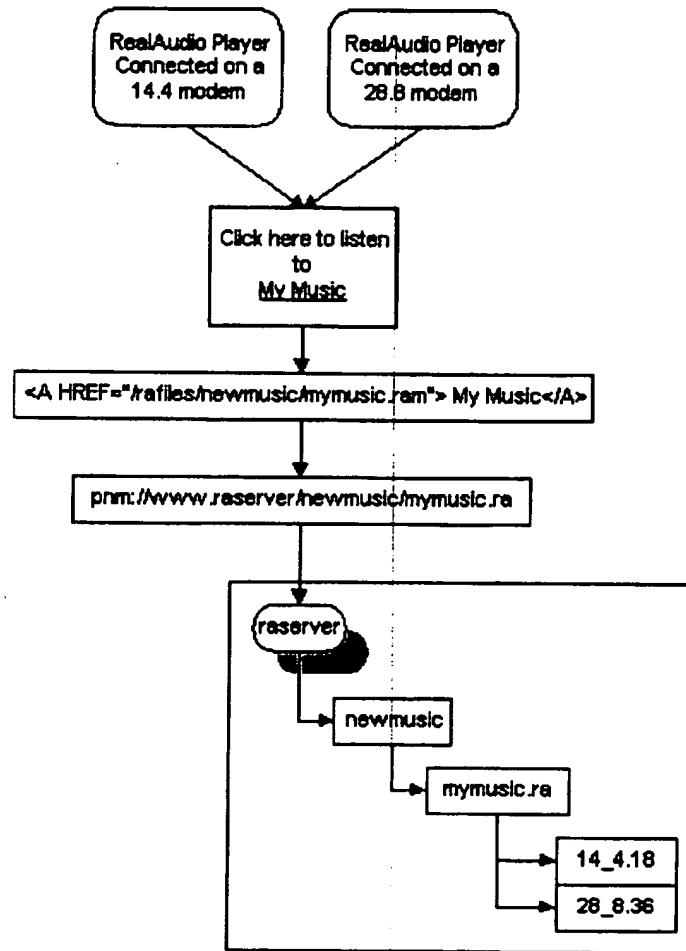
RealAudio Content Management

Bandwidth Negotiation

Bandwidth negotiation is a Server feature that allows visitors to your Web site to automatically receive the highest quality format available to their computer, while only requiring one link to a particular content file on your Web site. For example, without bandwidth negotiation, to provide content in both 14.4 and 28.8 formats, your Web site would require two Hypertext links and two metafiles, one to a 14.4 file and one to a 28.8 file. Using bandwidth negotiation, however, you would only need one Hypertext link and one metafile.

Bandwidth negotiation not only makes Web page creation easier, but also provides the structure for logical RealAudio content organization. The process of creating Web pages and metafiles remains the same. The change occurs in how files are organized on your RealAudio Server (see Figure 3-6).

Figure 3-6. Bandwidth Negotiation.



The base level .ra file accessed in your metafile is not actually a file but is now a directory; the pnm:// URL in the metafile is still given a name with a .ra extension. Within that directory are the individual files for each encoding and bandwidth. Table 3-1 lists the encoding formats currently supported.

Table 3-1 Bandwidth negotiation file types.

Band width	Encoding	Filename
14.4	Standard RA	14_4.18
28.8	High Quality RA, type 36	28_8.36

The Server determines the format of the file to be played back using information provided by the Player. The Player is configured with information about its connection quality and capabilities and this information is passed to the RealAudio Server when a file is requested. The Server uses this information and its knowledge of the available file encodings to provide the appropriate one for the Player. If the connecting Player is an old Player that does not supply this information, the RealAudio Server uses its knowledge of the Player version to assign it capabilities. This allows bandwidth negotiation to work with any currently supported RealAudio Player.

As new encoding and bandwidth types are added, the new format files can easily be added to the directory. Note that the use of the directory structure mechanism is not mandatory – the RealAudio Server can still serve ordinary .ra files.

If the RealAudio Server is unable to locate the correct file for the encoding type and bandwidth requested by the Player the message defined in the configuration setting `DefaultErrorFile` will be played. If this file is not available a "File not found" error is sent to the Player.

Using the Bandwidth Negotiation Utility

As mentioned above bandwidth negotiation is a function of how files are organized. For this feature to work files must be organized in the following manner:

```
yourrafiles directory
    directory.ra
        14_4.18
        28_8.36
```

Where `yourrafiles` is the directory where you want to place your RealAudio content and `directory.ra` is the .ra file name referenced in the metafile.

The bandwidth negotiation utility `raconv` assists in creating this organization by generating the directory with the .ra extension and placing the appropriately renamed

14_4.18 or 28_8.36 file under that directory. The utility uses information in the .ra file to determine what format to rename the file. It does not convert between compression formats.

The following steps detail the creation of the file organization necessary for efficiently using the bandwidth negotiation utility.

Copy your files into two directories, one containing 14.4 format files and the other containing 28.8 format files. Since the utility renames the files you should always keep a back up of your original files until you are sure that the raconv process was successful. If you have the same content encoded in both 14.4 and 28.8 formats make sure they have the same name. For example, change test144.ra and test288.ra to test.ra, in separate directories.

The basic command to execute raconv is

```
raconv <InputFileName> <YourContentDirectory>
```

Where <InputFileName> is the file to be turned into a directory and underlying .ra file and <YourContentDirectory> is the directory under which you want to create the content directories. For example,

```
raconv c:\288files\6pmnews.ra c:\content\news
```

would take the file 6pmnews.ra from the 288files directory and create the subdirectory 6pmnews.ra with the .ra file renamed 28_8.36 in it and place it under the directory c:\content\news.

If your files have been organized by encoding format you can run raconv on a whole directory by entering wildcards for the <InputFileName>. For example,

```
raconv 288files/*.ra content/news
```

would take all the .ra files in the directory 288files and create new directories and files under the directory content/news.

raconv will not create or overwrite a .ra directory if it already exists, rather it just renames the file and places it under the pre-existing .ra directory. This allows you to run raconv on one set of files and to create the .ra directories with one format type in it and then run raconv on the other set of files and have them placed in the appropriate directory. For example, after creating 6pmnews.ra with the 28_8.36 file in it you could run

```
raconv c:\144files\6pmnews.ra c:\content\news
```

and the file 14_4.18 would be place in the 6pmnews.ra directory along with the already created 28_8.36 version.

1402250" 55020006

408250" 5940006

Chapter 4: RealAudio System Manager

The RealAudio System manager provides continuously updated information about current connections to the RealAudio Server. There is a Windows based System Manager and a UNIX command line System Manager. The System Manager can be opened from any computer that has a network connection to the RealAudio Server. This chapter covers information on:

- Graphical Interface System Manager.
- Changing the configuration of a running Server from the System Manager.
- Command line System Manager.

The RealAudio Graphical Interface System Manager

The graphical interface System Manager is run from Windows 95 or NT and can monitor a Server running on any platform. The System Manager contains three windows where you can view clients currently connected, files being played, and a graphical interpretation of all connections for the past two minutes. This highly versatile interface allows you to choose how you would like connection information interpreted and displayed. For example, you may wish leave the System Manager open on a corner of your screen with just the Player connections shown as a graph, allowing you to get a visual sense of the connection patterns on your Web site.

Installing the System Manager

If you purchased the RealAudio Server on CD-ROM follow the directions outlined in the *Installing Windows Based Tools* section in Chapter 1.

If you downloaded your RealAudio Server start by locating the directory with the System Manager setup files. Your System Manager will be located in the `c:\pnserver\bin\win_mon` directory if you are running your Server on a Windows

NT machine and in the `pnserver/bin/win_mon` directory if you are running your Server on a UNIX platform. Copy all the files from your System Manager directory to a temporary folder on the Windows machine which you want to act as the System Manager. Double-click on the `setup.exe` file and follow the directions to setup the System Manager.

Removing the System Manager on Windows

The Installation program provides an uninstaller that works from the Add/Remove Programs utility on the Control Panel.

Running the System Manager

Locate the directory where you had `setup.exe` install the System Manager. Double click on `monitor.exe` to open the System Manager. The System Manager window is blank when it opens. To connect the System Manager to the RealAudio Server, pull down the File menu and select New or Open. When the Open Connection window displays, choose the Server that you want to monitor from the selections shown (see Figure 4-1).

If the RealAudio Server you want to monitor is not in the list, you need to add it to the System Manager's selection menu. To do this, select the Add button. When the Add Connection window opens (see Figure 4-2), enter a name for the connection in the Connection Name box. The name of the machine that has the Server to be monitored needs to be entered in the Machine Name or IP Address box. The Machine Port is the port number that the System Manager will use to reach the RealAudio Server. The default is 7070. The Password is the same password that you entered into the RealAudio Server configuration file. Once you have entered all of the information, select OK to save the information.

Figure 4-1. Open Connection Box for System Manager.

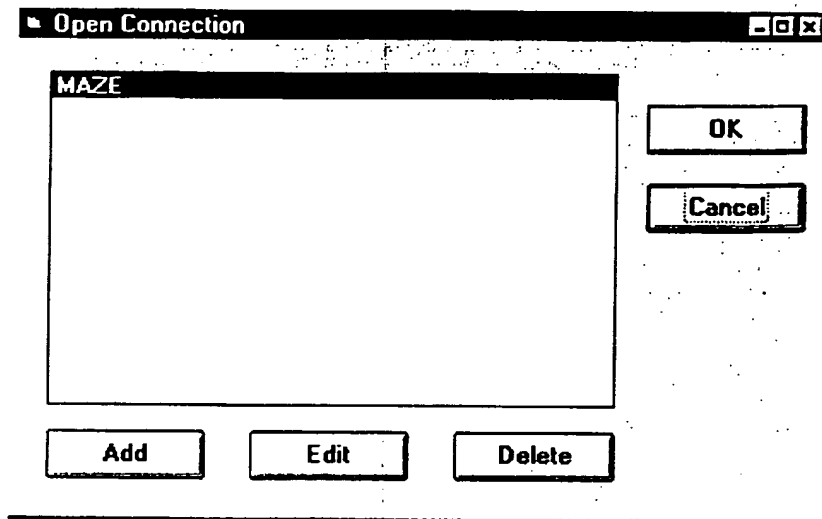
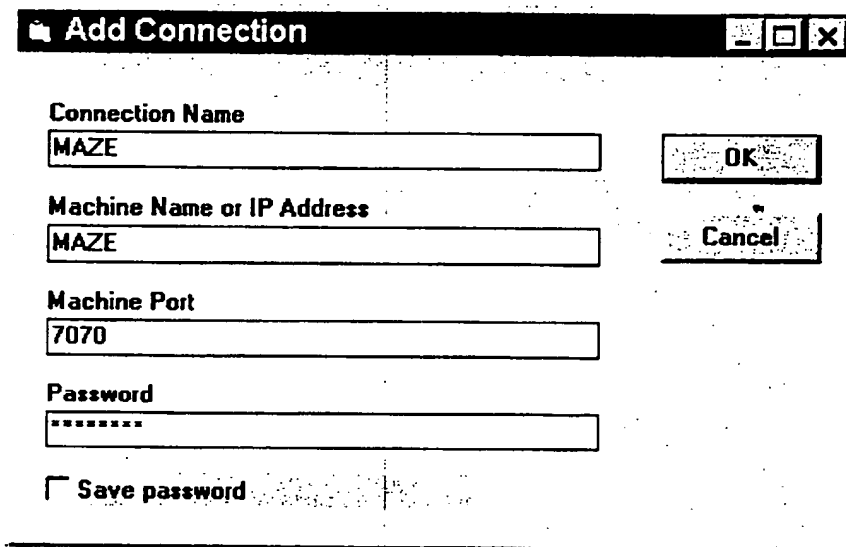


Figure 4-2. Add Connection window.



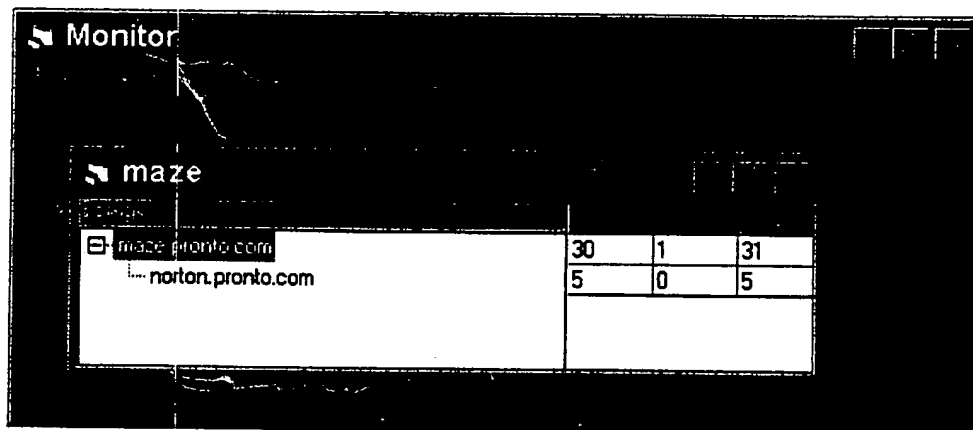
The System Manager automatically saves the connection information for all of the RealAudio Servers you enter. The number of System Managers that can be opened on any particular Server is only limited by the number of connections entered into the RealAudio Server's configuration file. If you have more than one RealAudio Server running, you can open System Managers for each Server on the same machine, and leave them open continuously for as long as the RealAudio Server is running.

To edit a connection configuration, select it in the connection list, then select Edit. After editing the information in the window, select OK to save the configuration.

To delete a connection, click on the connection name in the Open Connection window and select Delete.

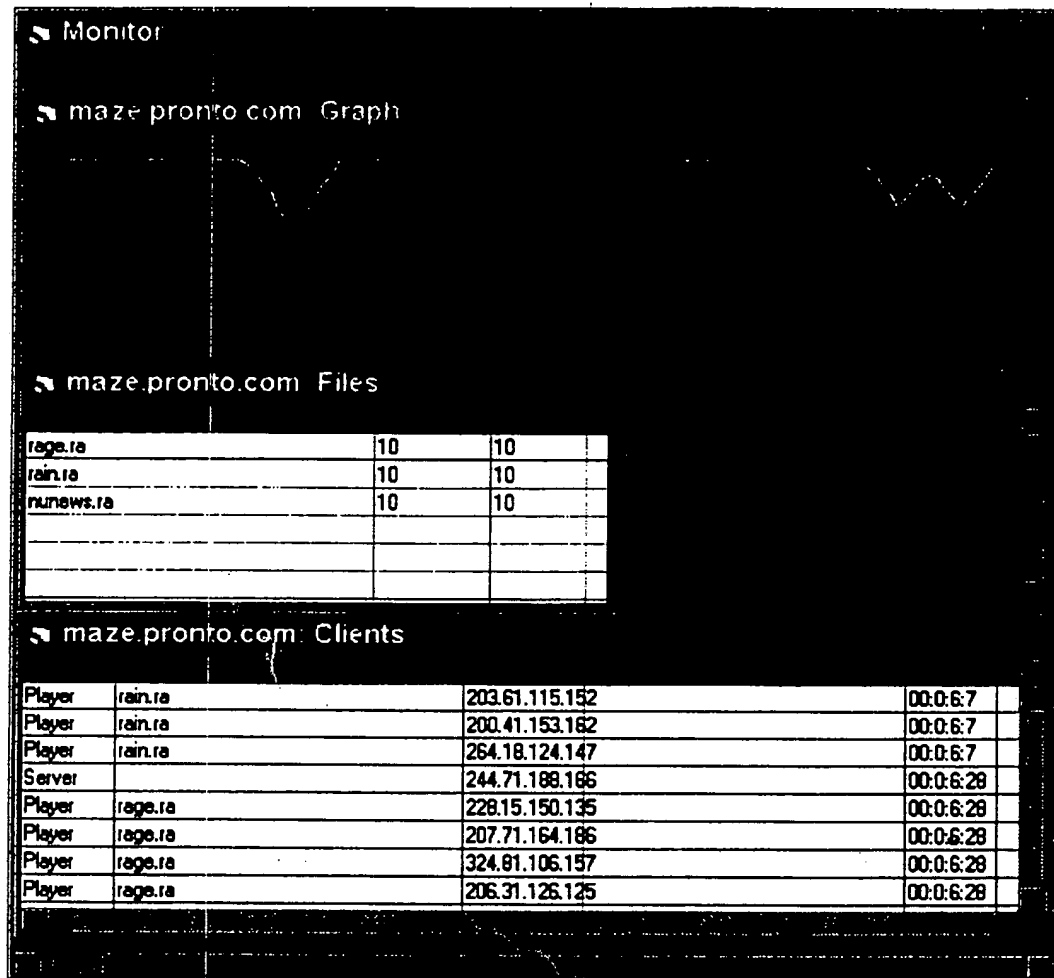
Once you have entered and selected the RealAudio Server you wish to monitor click OK. The following Window appears when the System Manager opens. (The Server displayed in Figure 4-3 shows a clustered Server configuration.)

Figure 4-3. System Manager window.



This opening window provides basic information about the RealAudio Server and clustered sub Servers. The Server Menu accesses more detailed information windows: Clients, Files and Graphs. Figure 4-4 shows these windows open simultaneously.

Figure 4-4. Graph, Files and Clients Windows.



The Clients Window

The Clients window is the only place where you can find out the length of time that clients are connecting to files on your Server. The information is presented in a way

that allows you to make an interpretation about the type of audience visiting your site. You can view the following information in the Clients window:

Type. The type of client connected, either Player or Monitor (System Manager)

File Being Played. Name of the file being played from your RealAudio Server

Domain Name. The domain name or IP address of the client computer. To toggle between IP address and domain name check "Do DNS Lookups" on the Clients Tab of the Options | Preferences menu.

Elapsed Time. The length of time that the client has been connected to that file since the System Manager has been attached to the Server.

The Clients window can be scrolled up or down to view all current connections to your Server. The window can be set to continuously update by checking the "update continuously" box on the Client View tab of the Options | Preferences menu.

The Files Window

The Files window tells what files are being accessed and keeps a running tab of the number of times each file is being played. This helps you determine which files are most and least popular, which could help you decide what new files to add or remove to improve the popularity of your site. You can view the following information in the Files Window:

File. Name of the file currently being played

Current. Number of clients currently connected to that file

Total. Total number of connections made to this file since the System Manager was started

The Files window can be scrolled up or down to view all current connections to your Server. The window can be set to continuously update by checking the "update continuously" box on the File View tab of the Options | Preferences menu.

The Graph Window

The Graph window gives a graphical interpretation of selected connections made to your Server in the past two minutes. The Graph tab of the Preference Window on the Options menu allows you to choose what information is displayed on the graph.

Windows System Manager Based Configuration

As mentioned earlier in *Changing the Configuration of a Running Server*, the System Manager from Windows allows for GUI based reconfiguration of the RealAudio Server. From the System Manager tool bar select Server and then Configuration. You are presented with a list of current configurations (See Figure 4-5), most of which you can then edit for immediate effect. All of the configuration parameters are presented, even if you have not entered a value for them.

UserList entries can not be added or deleted from the System Manager. The UserList entry only supports changes to existing entries from the System Manager. For example, you could change the maximum or minimum number of connections a particular account is authorized. To make more substantial changes to the UserList you will need to edit `server.cfg`.

If the RealAudio Server you are monitoring is running as a cluster host you will see the sub Servers listed in the main window of the System Manager. The sub Servers' configuration can be edited from the System Manager as well. Highlight the sub Server whose configuration you want to change and select Configuration from the Server Menu. You are prompted for a password and are then able to edit the configuration file of the sub Server.

For example, to change the maximum number of simultaneous System Manager connections you could enter 5 on the line under MonitorConnections and click on OK. This would then change the maximum number of simultaneous System Manager connections to five. Changing some of the configuration values has an immediate impact on the RealAudio Server, others only alter the behavior once the RealAudio Server is restarted. Chapter 3 details each entry and its impact on the RealAudio Server, while Appendix A details when changes take place and the default value, if any.

Viewing the Server configuration of version 1.01 Servers shows only Server version information.

Figure 4-5. System Manager based Server configuration.

The screenshot shows a window titled "Server Configuration". It contains several input fields and a radio button. The fields are pre-filled with the following text:

- `/usr/home/johnd/testroot/logs/pnserver.pid`
- `johnd`
- `/usr/home/johnd/rfiles`
- `2`
- `4`
- `10`
- `/usr/home/johnd/testroot/logs/pnserver.access`

There is a radio button with a dot inside, located between the first and second input fields.

The RealAudio UNIX Command Line System Manager

The RealAudio Command Line System Manager is used from a UNIX machine. It can monitor a Server running on a Windows or UNIX platform. Information

provided by the System Manager includes number and status of Player connections, System Manager connections, Unknown connections, which are connections that are currently being negotiated with the Server, and Total connections, which includes all of these. This information can then be used to monitor activity on the RealAudio Server on a regular basis.

The System Manager runs in two modes: interactive and non-interactive. When the System Manager is in the non-interactive mode, information is automatically appended to STDOUT every 5 minutes, unless that time span is modified by the `-l` command. The System Manager will accept commands from the command line; however, it does not prompt you. The interactive mode is started with the `-i` command, which enables the System Manager to print prompts and accept commands from the command line (command options are listed in Table 4-1).

The System Manager resides in the `bin` directory. From the `bin` directory type

```
monitor [options] <host>[:port]
```

Table 4-1 lists the command options available when starting the System Manager, `<host>` is the DNS hostname of the RealAudio Server you wish to monitor, and `port` is the TCP port which the RealAudio Server uses to accept clients.

Table 4-1. Commands available when starting the System Manager

Command	Function
<code>h/?</code>	Prints a list of commands.
<code>c</code>	Do a quick Server check and then exit.
<code>i</code>	Starts interactive System Manager mode.
<code>l <update frequency></code>	Time, in seconds, between each log update.
<code>k</code>	Do reverse DNS lookups.
<code>p <password></code>	Specify a password to use.
<code>v</code>	Print version information and exit.

For example,

```
monitor -l 20 -k -i yourServer:7070
```

would start monitoring host `yourServer` in interactive mode, with updates every 20 seconds and provide fully qualified host names for clients for which it can find host names.

It should be noted that the `-p` feature is not secure. The password is easily accessible to knowledgeable searchers. The password is required each time you want to start monitoring a Server. Entering `-p <password>` at the starting command line allows you to run automatic monitoring scripts.

Because the `-k` command does a reverse DNS lookup every time a new client contacts your Server this command will slow down responses on the System Manager. Once enabled the reverse DNS lookup feature continues to run until turned off. If you are experiencing delays in System Manager information or in response to commands, make sure that the reverse DNS lookup feature is turned off. This feature can be accessed from either the startup command line or the System Manager command line.

The commands available at the System Manager command line are described in Table 4-2.

Once it has been started, the System Manager prompts you for the Server's System Manager password, unless you entered in on the start command line. Without the password you cannot connect to the RealAudio Server.

When the System Manager password is validated, the System Manager initiates contact with the RealAudio Server and begins to receive information from it on the current number of connections, uptime, and so on. The information is displayed as follows:

`<client> <name>`

where `<client>` would be the type of client connected, i.e., Monitor or Player, and `<name>` is the domain name or IP address for that client. For example, a typical display might look like the following:

monitor 204.71.154.93

Player 204.71.153.24

Table 4-2. Command options used to control the function of the Command Line System Manager in the interactive mode after the System Manager has been started.

Command	Function
h/?	Prints a list of commands.
s	Prints a single line of summarized status information.
o	Prints # of Players, System Managers, unknowns, and total connections to STDOUT every five minutes, or the number of seconds specified by the "-l" option on the command line. This command can be toggled to start and stop.
u	Continuous display. Updates whenever a client status changes.
l	Provides the current list of connected clients.
k	Begins collating hostname information for connected clients by doing reverse DNS lookups on the IP numbers provided by the Server.
f	Shows information on multiprocess Servers
n	Modify configuration variables
t	Requests latest configuration settings from the RealAudio Server
c	Displays the current configuration after it has been gotten using the t command
w	Provides information on clustered Servers
x	Exit the program.

When the u command is enabled, you receive messages every time the connection status changes. In this case, the System Manager provides the following information:

```
<time> <event> <name> <filename>
```

where <time> would be the time the client connected, <event> would tell whether the client was able to connect or not, <name> is the domain name or IP address for that client, and <filename> is the name of the file being played. For example, a typical display might look like the following:

```
16:20:07 Disconnected 12.345.67 hello.ra
```

If you would prefer to receive System Manager information in a report rather than in a display, use the -l command and append information to a file. To do this, start the System Manager with the following command:

```
monitor -l<seconds> <hostname>[:port] >> monitor.txt
```

where <seconds> is the number of seconds between reports, <hostname> is the host name where your report is located, and monitor.txt is the name of the report that the information will be appended to. An example display is as follows:

```
monitor -l300 Hal:6970 >> monitor.txt
```

After using this command, you are prompted for the password (the prompt is sent to STDERR), and then it will print data to the monitor.txt file every 300 seconds. The data is in the same format as the data printed by the -o command. Use the password from the RealAudio Server's password file. When this command is used, you will not see information displayed on the screen. As long as the System Manager is running, information continues to be added to the report.

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Appendix A: Server Configuration Table

PARAMETER NAME	DEFAULT SETTING (used if not specified in configuration file)	CHANGES	SHIPPED SETTING (Settings in Supplied Config file)
AudioConnections	10	Restart	
BasePath	rafiles	Anytime	rafiles
CustomerName	USER MUST ENTER	Anytime	
ErrorLogPath	pnerror.log	Anytime	logs/pnerror.log
Group	%-1	Restart	
LicenseKey	USER MUST ENTER	Anytime	
LogPath	pnaccess.log	Anytime	logs/pnaccess.log
MonitorConnections	2	Anytime	
MonitorPassword		Anytime	
PidPath	pnserver.pid	Anytime	logs/pnserver.pid
PnaPort	7070	Anytime	
Timeout	300	Anytime	
User	%-1	Restart	
ClusterHost		Restart	
ClusterPassword		Anytime	
ClusterPort		Restart	
DefaultErrorFile	error.ra	Anytime	
MaxThreads	1	Restart	
UserDir		Anytime	
UserList		Anytime	

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Appendix B: Firewalls

Many companies and organizations have connected their local area networks, wide area networks, and the Internet together in what is commonly referred to as a global area network. While extremely beneficial in terms of communication and access to information, this interconnectivity can expose a company's network and mission critical information to unauthorized entry and access.

Firewalls are security devices used to protect private networks from unauthorized access through the Internet. Many companies use firewalls to control access to their networks and proprietary information. The role of a firewall is to ensure that all communication between an organization's network and the Internet conform to the organization's security policies.

Firewalls use two primary methods to secure transmission to and from internal networks and the Internet: proxy services (also known as application-level gateways) and packet filtering.

With proxy services, the firewall first determines if a requested connection between a computer on the internal network and one on the outside is permitted. If the connection is authorized, the firewall, acting as an intermediary, sets up the necessary communication links between the two computers. As an intermediary, the firewall can monitor the communication between the two networks and suppress any unauthorized activity.

Packet filtering uses a single, unified packet-filtering engine, through which all network traffic is processed and then either forwarded or blocked based on a set of logical rules defined by a firewall administrator. Many organizations use a combination of packet filtering and proxy firewalls to achieve a higher level of security.

The RealAudio Server and Firewalls

Use of the RealAudio Server in conjunction with a network security firewall requires careful consideration of the risks and benefits. Depending upon your organization's security policies, your RealAudio Server could be placed on a host either inside or outside your network security firewall.

Regardless of the type of firewall being used, if you will be offering content to the Internet on your Web site, Progressive Networks recommends placing the RealAudio Server on a dedicated host or hosts located outside your protected network. This arrangement allows users of the World Wide Web to access your web sites' real-time

multimedia content without compromising your private network or interfering with your security firewall. On the other hand, RealAudio Servers placed behind firewalls are ideally suited for serving private RealAudio content to users residing on the protected network.

If, however, you chose place your RealAudio Server behind a firewall and you wish to permit outside hosts to contact your Server, you must configure your firewall to allow RealAudio to pass through. To do this, you must permit two-way TCP connections on port 7070 and outgoing UDP packets on all ports between 6970 and 7170. These requirements are similar to those for an FTP server.

Progressive Networks also recommends that the host machine running the RealAudio Server be assigned a single IP address. Hosts which have been assigned more than one IP address (multi-homed) can cause problems with the streaming of RealAudio through some firewalls.

The RealAudio Player and Firewalls

If you're on a local area network which is attached to the Internet, and are unable to play RealAudio files from remote Web sites, it's possible that your company's firewall is preventing the RealAudio stream from reaching you.

Working in conjunction with third-party firewall vendors, version 2.0 of the RealAudio Player will allow Internet users behind commercial firewalls to receive RealAudio. These firewalls will be able to identify RealAudio files and direct them in a secure manner to requesters located on internal networks. A list of commercial firewall manufacturers who support RealAudio can be found on Progressive Networks' web site at

<http://www.realaudio.com/help/firewall/vendors.html>

If your firewall manufacturer is not listed, tell your firewall representative to contact us about joining our firewall developers program.

Organizations using either a proprietary or public domain firewall can obtain specifications for building their own proxy service from the Progressive Network web site. To obtain these specifications, ask your firewall administrator to fill out the on-line firewall information request form located at:

<http://www.realaudio.com/help/firewall/inforequest.html>

Companies with generic packet filter firewalls can take advantage of RealAudio by reconfiguring their firewalls. Progressive Networks has produced documentation to

help firewall administrators configure packet filter firewalls to support RealAudio.
This information is available at:

<http://www.realaudio.com/help/firewall/config.html>

More Information on Firewalls

For more information on network firewalls and their configuration, the following sources are available on the Internet:

Public firewall mailing list: <http://www.greatcircle.com>

Public domain firewall toolkit: <http://www.tis.com>

Firewall Product Developers Consortium: <http://www.ncsa.com>

For the most up-to-date information on RealAudio and firewalls please visit our
firewall Web page at:

<http://www.realaudio.com/help/firewall>

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Appendix C: RealAudio Server Error Messages

Server General

Cannot open ACCESS for logging.
Can not get resource limit: <oserrormessage>
Can not set resource limit: <oserrormessage>
gethostname failed <errno>
OS limit exceeded; max connections set to <connectionnumber>
illegal URL <url>
Invalid URL: <url>
Invalid bandwidth request: <bandwidthpath>
Invalid bandwidth request: <bandwidthpath>
SIGHUP received, code: 1
SIGINT or SIGTERM received, code: 2
<processid> exited
Terminating with exit code %d
Event file is corrupt
RTTP1 Monitors not allowed.
New live connection dropped due to server limit
New audio connection dropped due to server limit
New monitor connection dropped due to server limit.
New subserver connection dropped due to server limit

Server Comms

<connectionid>: Illegal hello message: <data>
<connectionid>: Version %d protocol not supported

Licensing

Server expired, no new connection will be accepted
Invalid license key or information
This license is for another platform.
Server cannot be started before <date>
Server cannot be started after <date>

Your license does not permit ISP Hosting.

Server Configuration

expected ',' or ']' in list at line <lineno>
Invalid number of elements in struct at line <lineno>
Invalid punctuation token '<character>' in config file.
Invalid integer at line <lineno>
Expected type to be a string or an int.
Expected type to be a string.
Expected type to be an int.
Invalid integer.
Negative values not allowed.
Expected type to be a list.
Expected type to be a struct.
Invalid configuration.
You must restart the server for this change to take effect.
Could not verify that BasePath is valid.
You must specify a base path. If you want to specify the current working directory, then use '.'.
Invalid group id.
Invalid group name.
Can't change to group id.
Invalid user name.
Invalid user id.
Can't change to user id.
Invalid license.
This license is not yet valid.
This license has expired.
Invalid error log path.
Invalid log path.
You have allowed more user max streams than the server can support.
You have reserved more user min streams than the server can support.
Can't open the pna port.
Invalid platform in the license.
Invalid timeout.
MaxThreads must be greater than zero.
AudioConnections must be greater than MaxThreads.
Min streams for user '<username>' exceeds max streams
User '<username>' already in UserList, skipping.
User max streams exceed licensed audio connections.
User min streams exceed licensed audio connections.
Can't open config file server.cfg
MaximumAudioConnections too large,

No such group: <groupname>
Must specify a number for Group config variable.
No such user: <username>
Must specify a number for User config variable.

Server Clustering

clustering not enabled for this server
Password failure on cluster attempt from <hostname>:<portno>
<connectionid>: subserver init message not sent
Unknown subserver opcode <opcode>
Unknown type in cluster_update
Cluster list is corrupt
Header failure from subserver eof <no> error <errno> <clusterid>
Cluster password expected
Data failure from subserver
Cannot find global id structure
No global ids available for subserver
Cluster password incorrect
Unknown superserver opcode <opcode>
Can not connect to <hostname>:<port> error <errno>
Data failure in init eof <no> error <errno>
Header failure from superserver eof <no> error <errno>
Data failure from superserver
Unable to allocate global root id
No cluster password
Cannot cluster with <hostname>:<port>
<connectionid>: Unable to redirect
<connectionid>: Client broke connection

Server Technical

Bad header: ileave: <no> gran: <no>, channels: <no>, frame: <no>, bpm: <no>
Forked subserver count exceeded
No read streams for select
<connectionid>: bad player
<connectionid>: read: <oserrormessage>
<connectionid>: write: <oserrormessage>
Unsupported event type 0x%x
<connectionid>: unknown error state <errorstate>
<connectionid>: port <portno>: <oserrormessage>
<connectionid>: monitor rejected
Invalid opcode: <opcodeno>

Accept on port <portno>: <oserrormessage>
SIGCHLD received, pid <processid> status <exitcode>
SIGPIPE received, code: 13
Socket initialization failed with error <errorcode>
WSACleanup failed %d
Bad magic string for event file
Version %d is incorrect for event file
Unknown entity type: %d
get_conn: error: <oserrormessage>
<connectionid>: Client broke connection in start state
<connectionid>: Client broke connection in key state

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Appendix D: RealAudio Server Setup Checklist

To ensure complete installation of the RealAudio Server, use the following checklist.

✓	Action Needed:
	Install the RealAudio Server
	Configure the RealAudio Server.
	Start the RealAudio Server.
	Use the RealAudio Player to test your Server.
	Configure the Web Server to recognize RealAudio MIME types
	Install the RealAudio Encoder and use it to encode audio files into the RealAudio format (with an .ra extension).
	Save RealAudio files to the directory set by the Base Path option in the configuration file.
	Create metafiles (with a .ram extension).
	Write links to metafiles in the Web page (HTML document).
	Use the RealAudio Player to test your site.

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Appendix E: Man Pages

pnserver

Name

pnserver - RealAudio streaming server

Synopsis

pnserver [-v] [-n] [-p port] [-s streams] [-t threads] configfile

Description

pnserver is the Server component of the RealAudio system. It provides real time access to Audio via a TCP/IP network. The configfile contains entries to configure the RealAudio Server, see the CONFIG section.

The following options are available

- v prints out the version information of the RealAudio Server. This includes the platform, build and release tags used to identify a particular release.
- n Don't detach from the command terminal. This prevents the server from becoming a daemon process.
- p port Use the supplied TCP port, port as the connection port for the server. This overrides any configuration file setting.

- s streams** Run the server with a maximum of **streams**. This overrides any configuration file settings.
- t threads** Start **threads** number of processes for this server. This overrides any configuration file setting.

Configuration

The configfile can contain any of the following settings. For more information on these settings refer to the Configuration Parameter Definitions, in the Configuration and Administration chapter.

AudioConnections	The maximum number of simultaneous audio connections. This can not exceed your licensed number of streams.
BasePath	This determines the location of the RealAudio content that the server will server. All incoming URL requests are relative to this base path.
CustomerName	Supplied by Progressive Networks. This is your registered Customer Identification
ErrorLogPath	File name for error logging.
Group	User Group to switch to after starting
LicenseKey	Supplied by Progressive Networks. This allows your server to operate.
LogPath	File name for Access logging
MonitorConnections	Number of simultaneous monitor connections allowed.
MonitorPassword	Password that the monitors must supply to allow monitoring and configuration.
PidPath	File name for current process id.
PnaPort	TCP port number for accepting player and sub server connections

Timeout	Time in seconds a player can remain idle before being disconnected.
User	User name to switch to after starting.
ClusterHost	Hostname or IP address of control Server in the cluster.
ClusterPassword	Password for connection to a cluster.
ClusterPort	Port that sub Server should connect to control Server on.
DefaultErrorFile	14.4 audio file that can be played to players that try to play a 28.8 file but do not have the codec or bandwidth.
MaxThreads	The number of processes to run for a server.
UserDir	Path added to hosting specified paths.
UserList	Sets up and defines a Hosting Service.

lta

Name

lta - RealAudio Live Transfer Agent

Synopsis

lta [-v] [-b basepath] [-p port] [-w password] [-s packetsize] [-m] [-q]

Description

The lta is used to broadcast a live event from the RealAudio Server. The RealAudio encoder connects to the LTA via TCP and the LTA creates a RealAudio file for the Server to serve.

The following options are available

- v prints out the version information of the lta. This includes the platform, build and release tags used to identify a particular release.
- b basepath The directory, **basepath** is where the lta will create the RealAudio file for the server. It is usually set to the same value as **BasePath** in the server configuration file.
- p port The lta will listen for incoming connections on port, **port**. This is the port that is used in the Live Encoder.
- w password The password, **password** supplied here is checked against the incoming password from the Live Encoder. If they match the connection is accepted otherwise the connection is dropped.
- m Create Bandwidth Negotiation compatible directory and files for any requested file names. This means a directory is created containing the appropriate encoder and bandwidth named file.

- q Quit after encoding a single file. Otherwise, the lta will accept and create files for multiple sequential connections.
- s **packetsize** **packetsize** sets the size of the packet that is read from the network. This can be changed if connection problems are observed. The standard size for incoming packets is 240. This can be increased on a LAN connection if packet loss is occurring. This must also be changed in the Live Encoder.

See Also

RealAudio Content Creation Guide

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monitor

Name

monitor - RealAudio Line based System Monitor

Synopsis

monitor [-v] [-l update] [-p password] [-c] [-i] [-k] hostname[:port]

Description

The RealAudio monitor allows remote monitoring and administration of the RealAudio server. To connect a monitor to a server the hostname is set to the DNS name or IP address of the server. If the server is running on a non standard port then the port is set to that port.

- v prints out the version information of the monitor. This includes the platform, build and release tags used to identify a particular release.
- l update Sets the update period for output to the screen to update seconds.
- p password Provides the password, password required by the monitor to connect to the server. If this option is not used the monitor will prompt for the password.
- c Connects to the server to verify it is still accepting connections and then exits. A message will be printed if the connection fails and the exit status is non zero.
- i Starts interactive mode, allows entry of the commands listed in the command section.
- k Do DNS lookups on incoming IP addresses to translate them to full domain names. This can slow down monitor operation as some names can take a significant amount of time to resolve.

Commands

Command	Function
h/?	Prints a list of commands.
s	Prints a single line of summarized status information.
o	Prints # of Players, System Managers, unknowns, and total connections to STDOUT every five minutes, or the number of seconds specified by the "-l" option on the command line. This command can be toggled to start and stop.
u	Continuous display. Updates whenever a client status changes.
l	Provides the current list of connected clients.
r	Forces the Server to reload configuration
k	Begins collating hostname information for connected clients by doing reverse DNS lookups on the IP numbers provided by the Server.
f	Shows count information servers running multiple processes
n	Modify configuration variables
t	Requests latest configuration settings from the RealAudio Server
c	Displays the current configuration after it has been gotten using the t command
w	Provides information on clustered Servers
x	Exit the program.

slta

Name

slta - RealAudio Simulated Live Transfer Agent

Synopsis

slta [-v] [-b basepath] -i input [-o output]

Description

The RealAudio slta is used to turn a existing RealAudio file into a RealAudio file that can be server as a live event. This can be used to provide delayed broadcast of a live event.

- v prints out the version information of the monitor. This includes the platform, build and release tags used to identify a particular release.
- b basepath basepath specifies the directory where the output RealAudio file is created
- i input the input file is the file that will be converted to a live RealAudio file.
- o output this is the name give to the resulting file. The output file will be created in the base path directory.

raconv

Name

raconv - RealAudio Bandwidth Negotiation file Converter

Synopsis

raconv [-v] src1 .. srcN directory

Description

raconv takes the supplied src files and converts them to the Bandwidth Negotiation naming scheme and places them in the directory directory. More then one src file can be supplied.

-v prints out the version information of the monitor. This includes the platform, build and release tags used to identify a particular release.

See Also

RealAudio Content Management, in the Configuration and Administration Chapter

cevents

Name

cevents - RealAudio Synchronized Multimedia Compiler

Synopsis

cevents inputfile outputfile

Description

cevents takes the supplied text file inputfile containing the Multimedia Event descriptions and converts it to a compiled multimedia file, outputfile.

File Format

The inputfile has the following format:

u <starttime> <endtime> <URL>

where each entry is on a single line with each value separated by spaces and where ..

<starttime> is the start time of the event in HH:MM:SS.t format

<endtime> is the end time of the event in HH:MM:SS.t format

<URL> is the URL of the page for the event

See Also

RealAudio Content Creation Guide

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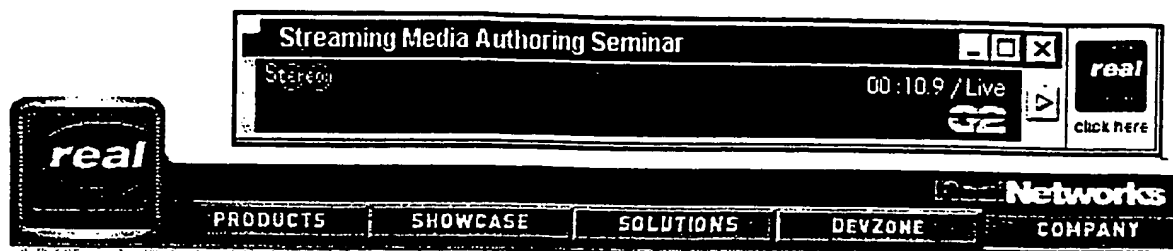
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Progressive Networks Introduces Version 2.0 of the RealAudio System

Open Architecture Enables Third Parties to Develop Integrated RealAudio Web Applications

Allows Customers To Deliver Synchronized Multimedia, Host Live Events, Deliver Music and Enhanced Audio On Demand

SEATTLE, October 30, 1995 -- Progressive Networks (PN) today announced RealAudio 2.0. RealAudio, which pioneered and is the emerging standard for audio on demand on the Internet, now features the following new capabilities:

- Support for live "netcasting"
- Support for FM (mono) quality audio and music over 28.8 baud or higher connections
- Synchronized multimedia capabilities that allow customers to deliver multimedia presentations through the Web
- Architectural support for scalability through combining the best of multicasting and narrowcasting
- Open architecture to enable integrated RealAudio third-party applications. "After 20 years in broadcasting, it's exciting to have the multimedia tools that RealAudio Version 2.0 empowers you with," said Robert Abbett, president, Internet Radio Hawaii. "One person can become an international broadcaster just like the major broadcast networks. I've encoded 15 different types of music and they all sound like great FM quality."

RealAudio System Version 2.0 will include several open architecture enhancements which will allow third party application developers to take advantage of the RealAudio System. Third party application developers will have access to a Playback Engine API (Application Programming Interface), and a Coder/Decoder API. In addition, the release will include a Netscape Plug-In which can be used to seamlessly integrate RealAudio functionality directly into the Netscape Navigator 2.0 client software, now in beta testing on the Internet. Other open architecture enhancement includes the ability to embed the player in such applications as Microsoft's Internet Explorer and Visual Basic.

"We are committed to open standards for the Internet and believe that publishing the RealAudio APIs and delivering plug-ins will enable on-line application developers to integrate the RealAudio standard into their software so that users can benefit from the quick and easy audio on demand system we have created," said Rob Glaser, president and CEO of Progressive Networks.

"The RealAudio Plug-In for Netscape Navigator not only integrates audio seamlessly, but also allows content producers to enhance their Web site with guided tours, narration and to turn their Web pages into full-blown multimedia shows," said David Rothchild, director of client product

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marketing at Netscape Communications.

"Working with Progressive Networks technology, our listenership has doubled every two weeks, and we expect that to continue to grow with the release of new RealAudio System Version 2.0 that's why we are expanding our service," said Mark Cuban, president of Audionet.

RealAudio System Version 2.0 will ship in Q1 1996. The beta version will be available for download in November for PCs running Windows 3.1, Windows 95 and Windows NT and for 68040 Macintoshes or PowerPC.

Each of the new features is detailed below.

Live RealAudio broadcasts: New real-time encoding and serving technology allows content providers to broadcast events, meetings, and news stories to an organization, or to the world, live, as they are happening, without time delays. This Live Streams feature was alpha tested on September 5, with the first live major league baseball game on the Internet - Seattle Mariners vs. New York Yankees.

Multimedia synchronization: RealAudio Multimedia synchronization allows content providers to control how the RealAudio Player appears, and embeds instructions into the RealAudio stream which can transform simple audio clips and Web pages into multimedia presentations.

Music on demand and improved audio quality: A new 18 kb algorithm optimized for the delivery of music will allow content providers to broadcast live concerts, and offer music on demand, with clean, crisp results.

Scalability: RealAudio Version 2.0 features architectural support for hybrid narrowcasting and multicasting. A network of special RealAudio server software, called Splitters, that will be deployed throughout the Internet during 1996, will over time enable RealAudio customers to deliver popular programming to tens or even hundreds of thousands of simultaneous listeners.

RealAudio Version 2.0 allows bandwidth negotiation between Servers and Players which enables the user to play audio of the best possible quality given available bandwidth.

Open architecture: RealAudio Version 2.0 open architecture enhancements will allow third party application developers to take advantage of the RealAudio System. Third party developers will have access to:

- ❑ **Playback Engine API (Application Programming Interface):** Will allow third parties to plug-in their own interface.
- ❑ **CODEC's API (Application Programming Interface):** Will allow third parties to plug-in their own audio CODECs (compressor/decompressors).
- ❑ **Netscape plug-in:** Will enable third parties to integrate audio on demand features directly into the Netscape Navigator 2.0, the popular network navigation software.
- ❑ **OLE and OCX integration:** Will enable third parties to develop programs around audio on demand files for better integration with the Internet and richer more robust applications.
- ❑ **Support for firewalls:** New support for firewall proxies allows organizations behind firewalls to serve up and receive live and on demand audio without exposing their network to security risks.

Progressive Networks' RealAudio client-server software system enables Internet and on-line users equipped with conventional multimedia personal computers and voice-grade telephone lines to browse, select and play back

audio or audio-based multimedia content on demand, in real time. This is a real breakthrough compared to typical download times encountered with delivery of audio over conventional on-line methods, in which audio is downloaded at a rate that is five times longer than the actual program; the listener must wait 25 minutes before listening to just five minutes of audio.

Since its introduction in April, over 600,000 RealAudio Players have been downloaded from the RealAudio Web site and more than 150 Web sites on the Internet offer RealAudio content.

Progressive Networks also offers a RealAudio Server product for major media content providers to distribute audio or audio-based multimedia streams over the Internet to a broad base of consumers and end users.

About Progressive Networks and Netscape Communications Corporation
Progressive Networks, based in Seattle, develops and markets software products and services designed to enable users of personal computers and other digital devices to send and receive audio and audio-based multimedia services using the existing infrastructure.

Netscape Communications Corporation is a premier provider of open software to enable people and companies to exchange information and conduct commerce over the Internet and other global networks. The company was founded in April 1994 by Dr. James H. Clark, founder of Silicon Graphics, Inc., a Fortune 500 computer systems company; and Marc Andreessen, creator of the NCSA Mosaic research prototype for the Internet. Traded on Nasdaq under the symbol "NSCP," Netscape Communications Corporation is based in Mountain View, California.

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